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THE
REPTILES
OF
BRITISH INDIA.

BY
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PREFACE.

THE coincidence of several most favourable circumstances, which seemed to promise a fair success, induced me to entertain the idea of making the Reptilian fauna of British India the subject of a special work; and I was confirmed in this, as I had frequent opportunities of observing that such a work would supply a real want among a class of men residing in India, who, imbued with a desire to promote Natural History knowledge, are deterred by the want of a work which would guide them in their first steps to acquainting themselves with objects coming daily under their notice, and which would show them where and how new facts may be gathered.

As this work is the first attempt to comprise the entire Reptilian fauna of the continent of the Indian region, it must be in many respects incomplete, although I trust it will form a basis for the labours of future times. Every one who makes the fauna of a country an object of special study has a triple task before him: first, to distinguish and systematically to arrange the species as exactly as possible; secondly, to make himself acquainted with their habits; and, thirdly, to ascertain the geographical range of each variety, of each species, of each genus. A perfect knowledge of the species is the first condition, without which progress in the two latter respects is impossible; and it is much more the part of that zoologist who is furnished with a complete series of the objects for repeated comparison and examination, and has access to the thousand volumes through which descriptions and notes are scattered, than of the naturalist and collector who has the opportunity of observing the animals in their natural haunts; on him mainly devolves the fulfilment of the two latter tasks; but scarcely anything has been done in this respect as far as the Indian Reptiles are concerned, and therefore my work, in its present shape, is one of abstract science.

I have enjoyed the great advantage of unlimited access to collections accumulated in this country from the time of Russell. A considerable number of the types used by this pioneer in Indian Ophiology are still preserved in the collections of the British Museum and of the Royal College of Surgeons; the types, with a very few exceptions, of the species described by Shaw, Gray, and myself, form part of the collection of the British Museum. Cantor had sent invaluable collections, containing his types, to the University of Oxford, where a part of the specimens, with his early manuscripts and drawings, are still preserved, and at a later period to the Museum of the East India Company, which contained also a number of the types sent by Kelaart and Griffith.

The entire collection of Reptiles of the East India Company was transferred to the British

Museum in the year 1860, and the task afterwards devolved upon me to name its contents, and to embody them in the national collection, together with very numerous additions received through other channels. I found that this could not be satisfactorily done except by a critical revision of the labours of my predecessors and of my own; but I had no idea of the proportions the work would finally assume, which was calculated to comprise descriptions of about 300 species, a number now raised to above 500. This considerable increase has been caused partly by the rediscovery of a number of species which, although noticed and named by previous writers, have been omitted in general works on Herpetology, or included among the synonyms on account of the inaccuracy or incompleteness of the original descriptions; partly by the establishment of many new species the characters of which could be defined only after an inspection of numerous specimens. In this respect I have been most liberally aided by the curators of public collections, who have allowed me to examine the specimens entrusted to their care; and it gives me great pleasure to express my best thanks to Mr. T. Moore of the Free Public Museum at Liverpool, to Mr. F. Moore of the India Museum at Fife House, to Mr. W. H. Flower of the Royal College of Surgeons, to Professor Grant of University College, and to the Curators of the Museum of the University of Oxford, of the Bristol Museum, and of the Collection at Haslar Hospital. Nor can I omit to express my acknowledgments for the aid I have received from gentlemen interested in similar studies. Mr. Walter Elliot entrusted to me a most valuable collection of original drawings made during his long residence in the Madras Presidency, and representing a number of its species. Mr. B. H. Hodgson gave me much information concerning the Reptiles of Nepal, drawings of which had been previously deposited by him in the British Museum. Sir A. Smith and Sir J. E. Tennent assisted me with collections from Ceylon. Captain R. H. Beddome communicated to me the discoveries made during his excursions in the mountains of the Carnatic and Mysore, sending at the same time typical specimens. Finally, Mr. L. L. Dillwyn gave me the types of the species figured in the 'Natural History of Labuan,' by which the synonymy could be rectified.

The present work being based upon collections mainly brought together within British dominions or in countries under British protection, I thought it best to define its object as an account of the Reptiles of British India. But it would have been very unphilosophical to exclude species which, however near to British territory, have not been obtained within its political boundaries, or to cut off the fauna of Burmah, Siam, CochinChina, and Southern China, forming as it does a natural unity with that of India proper. Besides, by extending my researches over the entire Indian continent, I became better acquainted with the geographical range of a species, and was better enabled to discriminate critically between really specific characters, and between those peculiar to local or individual variations. Further, it was of especial interest to point out where the Reptilian fauna of the Indian continent is intermingled with forms properly belonging to other regions. I have therefore included what is known of the Reptiles of Afghanistan, of Tibet, and of Northern China. In a few genera, like the Dragons and Sea Snakes, it appeared necessary to go beyond even those limits, and to treat of all the species known, in order to render the specific characters more intelligible, and to avoid omissions which would have been otherwise inevitable on account of the imperfect state of our knowledge of their geographical range.

A few words must be added in explanation of the plan followed in the arrangement of the

synonymy and in referring to previous writers. All the synonyms proper have been introduced,—that is, all the different specific denominations under which one and the same species has been described; but when the difference in the denomination was limited to the genus, I have selected those only by which the knowledge of the natural affinity of the species has really been advanced. I have likewise omitted all references to descriptions or notes by which no new fact has been added to the previously known history of a reptile. Changes in the generic nomenclature are frequently ventured upon now-a-days in the most unscrupulous manner by persons who, having seen only a small proportion of the species, copy the delusive characters of their new genera from the original descriptions, and with their most slender materials attempt to break up well-characterized and natural genera. Whilst the genus is that which, in the zoological system, simplifies most, and at the same time preserves the greatest variety of types—is therefore that which is most frequently used in our philosophical intercourse and operations, and ought to be as comprehensive as the natural affinities of the species will allow—any trifling character is now used to give a new generic name to every two or three species; and I am afraid this is more frequently done for the purpose of introducing the author to notice than from a desire to advance science. For it will be observed that, generally, the men who thus endeavour to burden our memory are not satisfied with having their name recorded in connexion with their systematic productions, but must have all the old, well-known species assigned to their credit also. Under all circumstances, such a change of the name of the authority for binomial designations is quite irrational, nor does our method imply anything which is untrue. Thus, when we speak of a *Eumeces punctatus*, L. (instead of Wieg.), or of a *Riopa punctata*, L. (instead of Gray), every herpetologist knows that Linnæus did not use the terms *Eumeces* and *Riopa*, and therefore that his name can have reference to the species only: which information is of greater value than that Wiegmann and Gray referred the species to some modern genus, as it guides us at once to the typical description on which the species for ever depends. Moreover, in numerous instances we are by no means certain whether the person who uses a new generic name really has identified the species of the elder author: thus, for instance, if Wiegmann or Gray had referred to their genera *Eumeces* or *Riopa* a species which they considered as the *Lacerta punctata* of Linnæus, but which in reality is different from it, every one who used the expression *Eumeces punctatus*, Wieg., or *Riopa punctata*, Gray, for the Linnean species, would commit an error. Therefore I hold, with the promoters of the rules of zoological nomenclature which were laid before the Meeting of the British Association in 1842, that the claims of an author who is induced to make alterations in previously existing generic arrangements do not extend beyond them, but should be duly recorded at the proper place, viz. in the synonymy of the genus.

On the other hand, I consider it inconsistent to apply the same rule to generic names: whilst a species when once properly described and named is fixed, a genus remains for a longer or shorter period in a fluctuating state, and frequently scarcely more than the name of old genera remains, or even a more modern generic name has quite a different significance from that attributed to it by its original inventor. In these cases science ought to pay more deference to the kernel than to the shell; and if, in an instance like that of the Ophidian genus *Ablabes* proposed by Duméril and Bibron, the original compilation is never adopted,

and no two herpetologists agree as to its extent, it appears much more natural and more for the benefit of science to append the name of that man whose modification of the genus is adopted, than to continue to quote *Ablabes*, Dum. & Bibr., which implies nothing beyond the fact that the *name* is the creation of the French herpetologists.

When elder authors thought themselves under the necessity of restricting a genus established by a predecessor, they invariably followed the practice of retaining the original generic name for the greater portion of the species. But this suits our modern reformers of zoological nomenclature much less than the absolute rule, that the first species (perhaps the most aberrant) should be considered as the type of the old genus. Are they of opinion that Linnaeus considered *Lacerta crocodilus*, the first species of his genus *Lacerta*, as the type? In this case they will be obliged to cancel Cuvier's name of *Crocodilus* for that of *Lacerta*, and to tack upon us a new name for our common Lizards!

Finally, I have to thank the Council of the Ray Society for the liberality with which they invariably granted my requests, and allowed an excess far beyond the originally contemplated limits of the work. My best thanks are due to Mr. Ford; his work speaks for itself.

A. G.

Hampton Wick,
31st May, 1864.

SYSTEMATIC INDEX,

WITH REMARKS ON THE DISTRIBUTION OF REPTILES OVER THE INDIAN CONTINENT.

THE fauna of so immense an area as that of the Indian Continent is much diversified, according to the physical peculiarities of its different districts, and according to their proximity to neighbouring regions. Although some of the districts are well enough explored to enable us to give an accurate account of the *general* character of their fauna, I am afraid that even here, in some special cases, we cannot avoid falling into errors, owing to the fallaciousness of our information as to where the specimens were collected. Of other districts the Reptiles are very insufficiently known, and the following remarks will show how much remains to be done. We are also much in want of accurate information whether a species is an inhabitant of the coast or of the interior, of the hills or of the plains, of the jungle or of the prairie.

I commence the following rapid sketch with the south-western corner, the island of Ceylon included. The leading type in this province is the family of *Uropeltides*, which are found nowhere else, and of which only one or two species extend into the Deccan; it includes, therefore, Mysore, the Carnatic, Malabar, and Travancore, and is one of the best-explored and best-characterized parts of India. It resembles the segment of a disk, of which Ceylon is the centre. A number of most peculiar forms radiate from this centre; but whilst some of the radii do not reach beyond the limits of the island, others extend more or less far into the peninsula, and diverging receive between them other types peculiar to northern latitudes. One of the most characteristic features of the Reptilian fauna of Ceylon is the total absence of affinity with Archipelagic types, as far as the Tortoises, Saurians, and Ophidians are concerned. There are no Dragons, no Callophides, no Calamaries, whilst a comparison of its Batrachians with those of the Archipelago does not show greater diversity than one of species*. A connexion with the African fauna is indicated by the presence of *Acontiadida*, and of a species of Chameleon, which has found its way from the continental portion of this province. It would be a mere repetition of the contents of our systematic index to repeat all the species peculiar to the island; and it must suffice here to mention the genera: *Otocryptis*, *Lyriocephalus*, *Crotaphora*, *Cophotis*, *Aspidura*, *Haplocercus*, *Cercaspis*. Characteristic forms which extend over to the peninsula, but not beyond, are *Testudo elegans*, *Emys trijuga*, *Salea*, *Cynophis*, *Hypnale*, *Daboia*, *Cyclophis calamaria*, and they are intermixed with others peculiar to this province (*Eublepharis*, *Sitana*, *Charasia*, *Tropidococcyx*, *Peltopelor*, *Cacopus*), and again with others which are, as it were, strangers in it. Of these latter we

* With the exception of a frog lately described by Peters as *Hoplobatrachus*.

must mention especially those the affinity of which is African: *Chamaeleo vulgaris* is more frequent than in Ceylon; a species of *Eryx*, *Echis*, *Psammophis*, and *Pyxicephalus* are common, and, singularly, so similar to their congeners from Africa, that it requires some attention to distinguish them; *Zamenis fasciolatus* is the southernmost species of a Mediterranean genus. On the other hand, we find some decidedly Archipelagic types: a Dragon occurs, strangely enough, on the west coast; *Callophis* finds here its western limits; and, finally, *Oligodon*, which extends from the larger islands of the western Archipelago, over Ceylon to the Deccan, has here its real centre.

The collection made by Colonel Sykes in the Deccan is still the only one of any importance made in that district; and it appears from it, and from what we gather from other sources, that it contains a sufficient number of peculiar forms to distinguish the Deccan as a separate province, but we cannot arrive at any conclusion as to its limits, the immense tract between it and the upper Gangetic plain being herpetologically unknown. The African types which we have noticed in the more southern province persist in the Deccan, and are increased in number towards the north-west.

The Reptilian faunæ of the two immense plains formed by the Indus and by the Ganges present entirely different features, though both are inhabited by the small number of such species as are spread over nearly the whole, and characteristic of the Indian region generally, like *Tropidonotus quincunciatus*, *Naja tripudians*, &c. The fauna of Sindh assumes an Indo-African character, extending for some distance southwards along the coast of Concan. Its southern and eastern limits are marked by *Uromastix* and by *Zamenis diadema*, the eastern representative of the African *Z. cliffordii*. Here, in Sindh and in the Punjab, disappear *Naja tripudians* and *Tropidonotus stolatus*; and when we pass into Afghanistan we find very few of its reptiles identical with those of India proper, *Euprepes rufescens* and *Calotes versicolor* being the only remnants of the Saurians, *Tropidonotus quincunciatus* of the Ophiidians, whilst a species of *Polypedates* and of *Rhacophorus* remind us of the Indian Batrachians, all the other reptiles belonging either to North-African or Central-Asiatic types.

The Reptilian fauna of Bengal is, as may be expected, well known. Herpetologically, this province extends beyond its political boundaries, including the upper Gangetic plain, and reaching southwards along the western shores of the Bay of Bengal to about 20° N. lat.; its northern boundaries are the Himalayas, where the fauna is gradually changed at an altitude of about 4000 feet above the level of the sea. Although there are several species peculiar to this province, like *Emys thurgi*, *Emys hamiltonii*, *Gavialis gangeticus*, *Ferania*, yet the features of its fauna are of a plain and rather uniform character, not relieved by forms which would awaken particular interest by their divergence from the ordinary Reptilian types or by their affinities with distant regions. This, of course, is quite in accordance with the uniformity of its physical features and with its central position. Thus, its fauna is chiefly composed of the common species ranging over a greater or smaller part of the other provinces. Archipelagic types are very scarce; *Passerita* is lost on its south-western borders and now replaced by *Tragops prasinus*, which extends over entire Eastern India. *Dipsas* has become more numerous, there being five species known from this province alone.

The Reptilian fauna of the Himalayas is distinguished less by the appearance of forms similar to, or identical with, those of the neighbouring temperate region, than by the appearance of a great number of new species and genera peculiar and confined to the

Himalayas*, and by the disappearance of such species as are abundant in Bengal; this change commences to be very marked from an altitude of 4000 feet above the level of the sea. It is remarkable that the Nilgherries do not show any traces of a fauna similar to that of the corresponding altitude in the Himalayas, although rising to 8000 feet. On the other hand, the reptiles of the Khasya Hills show such a degree of identity with those of the Himalayas that they must be referred to the same fauna. Probably High Assam also belongs to it, but we know too little of this country to draw any definite conclusion. In Tibet the Himalayan fauna is mixed with that of Temperate Asia, *Bufo vulgaris*, *B. calamita*, and *Phrynocephalus caudivolvulus* being apparently of not uncommon occurrence; in the Himalayas proper a representative of the Central-Asiatic genus *Italis* is found, and, most singularly, in Khasya a *Pseudopus*.

We are obliged to leave the vast extent of the central parts of Eastern India as having been scarcely touched by collectors, and to return from the alpine province of India to the eastern coast of the Gulf of Bengal, and to follow it round the Malayan Peninsula to Siam. This belt of land is well explored, and distinguished by a Reptilian fauna which assumes more and more the Archipelagic character the nearer we approach to the Malayan Peninsula, where more than one-half of the reptiles are species found also in the islands of the Archipelago. I will first mention the most remarkable of the species peculiar to this province. The Tortoises are numerous: *Testudo elongata* extends from Arakan into Siam, *Manouria* from Arakan to the Malayan Peninsula; in Tenasserim appear *Cyclemys oldhami*, *Emys ocellata*, *Emys crassicolis*, extending more or less southwards or eastwards; in Siam *Geomyda grandis*, *Emys macrocephala*. Not less characteristic are the Saurians and Ophiidians: *Crocodilus siamensis*, *Acanthosaura*, *Dilophyrus*, *Physignathus*, *Liolepis*, *Herpeton*, *Hipistes*, *Xenelaphis*, &c., whilst the Batrachians are almost identical with those of the other provinces and of the Archipelago. Quite isolated is the occurrence of a tailed Batrachian (*Plethodon*) in this province. As regards the Archipelagic types, we first meet them well represented in Tenasserim, where, among others, *Cuora amboinensis*, *Geomyda spinosa*, *Gonyosoma orycephalum*, *Bufo asper* occur; there also is the northern limit of *Draco*. Their number is considerably increased in the southern parts of Siam by the addition of species of *Bronchocela*, *Calamaria*, *Xenopeltis*, *Homalopsis*, *Calloselasma*, *Oxyglossus*, until in the Malayan Peninsula they actually outnumber the continental types.

Laos and the central and northern parts of Cochin-China are almost unknown, the little that we do know being due to the labours of Mouhot, who perished before he had well commenced to reap the rich harvest before him. A few species had been described by Cuvier. It would appear that the fauna stands in the same relation to that of the preceding province as the fauna of the Deccan to that of Southern India, but it would be too hazardous to draw any conclusion from so small a collection of facts.

From China a great number of collections have been imported for many years, and we can hardly look forward to very numerous additions to our list of species, except perhaps from the western and south-western provinces; but our knowledge of the geographical range of most of the species known is very defective, "China" having been considered sufficient information as to their habitat. Moreover the Chinese carry on a brisk trade in natural-history objects in their seaports, mixing not only collections from the different parts of the empire, but also

* See a paper in the Proc. Zool. Soc. 1860, p. 148.

frequently selling to the European collector specimens imported from other parts of the East Indies. Thus, although the list of Chinese reptiles clearly indicates two distinct faunæ, one of a thoroughly tropical character, and the other showing the influence of the neighbourhood of the temperate region, it would be a mere guess to point at a boundary-line where the northern one commences to predominate. However, collections made by Dr. Cantor during his residence in Chusan, by Mr. Swinhoe during the campaign in North China, and by the same in the island of Formosa, show that the change from the tropical to the temperate fauna is very gradual, and that the two faunæ deeply intersect each other. For whilst a *Hyla* extends as far southwards as 22° N. Lat. (to the southern part of Formosa), *Zaoecys* persists in Chusan (30° N. Lat.). This mixture of both faunæ is the character of the Chinese province, which otherwise is not distinguished by peculiar types strikingly different from those of the neighbouring provinces. Although the number of species rapidly diminishes the further we proceed northwards, on the whole it is great, but they belong to widely spread genera, and it will be found comparatively small when we shall be better acquainted with the fauna of the other Indian provinces. However, the Freshwater Tortoises are represented as well as in the Malayan province, and the occurrence of *Trionyx sinensis* may assist in fixing the southern boundary of the Chinese fauna. Several species with affinity to the North American or Japanese fauna are added to this mixture of types of the Old World.

When we proceed from Southern China towards the north, we find that *Lirolepis*, *Naja*, *Tropidonotus quincunciatus*, *Lycodon aulicus*, and *Polypedates* are the first to disappear; their place is taken by *Bungarus semifasciatus*, *Tropidonotus annularis*, *Lycodon rufazonatus*, which southern forms are associated with the northern of *Hyla chinensis*, *Halys blanfordii*, and *Coluber rufodoratus*. The last species of *Simotes* (*S. swinhonis*) occurs near Amoy. In Chusan also the *Bungarus* just mentioned is lost, whilst two other true *Colubri*, *Rana esculenta*, and *Bufo vulgaris* enter. Finally, in Northern China every trace of the Indian Reptilian fauna has disappeared, and the greater part of the forms are even specifically identical with those of Central Asia and Europe.

FIRST SUBCLASS. REPTILIA PROPER.

THE ORDER OF TORTOISES—CHELONIA.

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* In the description of this species, p. 303, I ought to have said "eastern half of the continent," instead of "western half of the continent."

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THE REPTILES are oviparous or ovoviviparous vertebrate animals with red, cold blood, with three cavities of the heart, breathing by lungs either during the whole period or, at least, in the later stages of their growth. They are naked ; but frequently the skin shows scale-like folds, or is tubercular, or forms osseous scutes.

First Subclass. REPTILIA PROPER.

Only one ventricle of the heart, incompletely divided ; two atria. Never possessing branchiæ at any period of life. One occipital condyle. Skin with scale-like folds, or tubercular, or forming osseous scutes.

This Subclass comprises the Order of *Tortoises* (CHELONIA), p. 1, that of *Lizards* (SAURIA), p. 56, and that of *Snakes* (OPHIDIA), p. 163.

THE ORDER OF TORTOISES—CHELONIA.

The Tortoises are Reptiles with the bones of the thorax united into a carapace.

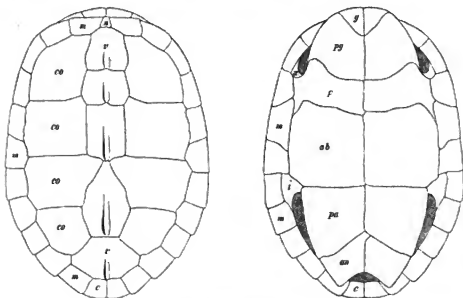
The shell of the Tortoises is formed by an osseous structure covered over with an epidermoid coat. The bones participating in the formation of the shell are the vertebrae, the ribs, and the sternum, which are so dilated that their edges form sutures with those of the neighbouring bones. In some freshwater and marine tortoises, and in young individuals, large interspaces between the ends of the ribs and between the sternal bones are, or remain, cartilaginous. We distinguish in the shell of a Tortoise the upper part, which is more or

less convex and formed by vertebræ and ribs, and the sternal part. This osseous shell receives in its interior the organs of the chest and of the abdomen, the humeral and pelvic bones, and the muscles for the humerus and for the femur. Only the cervical and caudal portions of the vertebral column are free and moveable. The skull is articulated to the atlas by a single condyle.

The epidermoid coat, covering the osseous shell, is divided into numerous large horny shields or plates, not corresponding to the single bones of the carapace: in some species the coating is soft, not horny, and not divided into shields. The integuments of the head, neck, tail, and limbs are similar to those in the Saurians, smooth, or tubercular, or scaly.

Teeth are wanting, but their office is fulfilled by a horny cutting sheath on each jaw, similar to the bill of a bird (Parrot). The intestinal tract terminates in a cloaca, into which open the ducts from a large urinary bladder and from the genital organs. The penis is single, provided with a corpus cavernosum and with a groove to conduct the semen. The ovaria are paired, containing numerous eggs, which are coated over with a hard or flexible shell during their passage through the oviduct. The eggs are deposited in a hole made by the mother and carefully hidden under a layer of sand or mould; they are not incubated, but hatched by the sun.

The following woodcuts will explain the divisions of the epidermoid coat, the single shields forming one of the most important characters for the distinction of the species.



PANGSHURA SMITHII.

n. Nuchal.
v-c. Five vertebrals.
co. Four costals.
m-m. Eleven marginals.
c. Caudal.

g. Gular.
pg. Postgular.
p. Pectoral.
ab. Abdominal.

pa. Preanal.
an. Anal.
x. Axillary.
i. Inguinal.

The Tortoises show great differences in their mode of life, and may be divided into the following families:—

- A. Toes distinct; feet for walking, without web between the toes. Shell with horny shields; caudal shields united into one: *TESTUDINIDÆ* or *Land Tortoises*, p. 8.
- B. Toes distinct; feet for walking and swimming, with a web between the toes; claws 5 (4)—4. Shell with horny shields; caudal shields separate: *EMYDIDÆ* or *Freshwater Tortoises*, p. 9.
- C. Toes distinct; feet for swimming, strongly webbed; claws 3—3. Shell covered with soft skin: *TRIONYCIDÆ* or *Freshwater Turtles*, p. 43.
- D. Feet without distinct toes, fin-shaped: *CHELONIDÆ* or *Marine Turtles*, p. 51.

First Family.

THE LAND TORTOISES—*TESTUDINIDÆ*.

Shell very convex. Toes distinct; feet club-shaped, for walking; no web between the toes. Shell with horny shields; caudal shields united into one.

Only one genus is found in British India.

TESTUDO.

Testudo, (L.) *Oppel*.

Thorax and sternum solid, entirely bony, united into an immoveable case; the upper shell very convex; sternum concave in males, flat in females; gular plates not united. Feet club-shaped; toes very short, not webbed; five (rarely four) claws anteriorly, four posteriorly. Only one caudal plate.

The head, feet, and tail can be completely retracted within the shell. These animals are entirely terrestrial, being the worst swimmers of the whole class of Reptiles, with the exception of the Chameleon. Their movements are slow. They feed on vegetables, and are easily kept in confinement if not removed to a much colder climate than that of their native country*. They are edible, but of small size, with the exception of the so-called Indian Tortoise, which attains to a length of 4 feet, but which is not found in India proper. The specimens of this gigantic Land Tortoise come either from the Seychelles or from the Galapagos Islands.

Synopsis of the Indian Species.

- Black, with yellow areolæ, and with yellow streaks radiating from the areolæ . . . *T. elegans*, p. 4.
- Four claws anteriorly. Pale, varied with blackish; areolæ of the vertebral plates behind the centre *T. horsfieldii*, p. 7.
- Five claws anteriorly. Yellowish, each abdominal plate with a large black blotch in the middle; areolæ of the vertebral plates in the centre *T. elongata*, p. 8.

* See a more detailed account of their habits under *Testudo elegans*.

TESTUDO ELEGANS. *The Starred Tortoise.*

Testudo elegans, Schoeffl, p. 111. tab. 25 (young).

? *Testudo stellata*, Schweig. *Prodr.* sp. 13.

Testudo actinodes, Bell, *Zool. Journ.* iii. p. 419, iv. tab. suppl. 23 (24), and *Testud.* pl. (gibbous variety).

— *stellata*, Gray's *Synops. Rept.* p. 12. tab. 3 (middle age).

— *geometrica*, Hutton, *Journ. As. Soc. Beng.* vi. 1837, p. 689. pl. 38 (adult male).

— *megalopus*, Blyth, *Journ. As. Soc. Beng.* xii. 1853, p. 640, is, according to an oral communication by Mr. Blyth, identical with *T. elegans*.

Form.—The shell of the *adult* is regularly oblong-ovate, contracted towards both ends and elevated in the middle, with the lateral margins very slightly curved. It is rather higher than broad, its greatest depth being much more than the width of the sternum between the front incisions. The upper shell has a deep, broad, obtusangular notch anteriorly, and the sternum a similar one, but of less depth, posteriorly. The sternum is a little broader between the hinder incisions than between those in front. *Very young specimens* have a nearly globular shell, the front and hind portions not being yet produced. In specimens of a more advanced age, of from 2 to 3 inches in length, the shell still retains its rounded outline, but becomes more depressed, so that it appears broader than high; these shells have very large areolæ occupying the centre of the plates and surrounded by two or three horny rings.

In many adult specimens the single plates are more or less elevated into prominent humps, the height of which may be from half an inch to an inch. This peculiar form is so frequently found, that we cannot consider it as a monstrosity, but rather as an indication of very great age. If the shell is viewed from the inner side, deep impressions may be seen corresponding to the external prominences.

Plates.—The areolæ of the vertebral plates are in the centre, of the costal plates between the centre and the upper margin, and of the marginal plates in the lower posterior corner. No nuchal plate. Areolar portion of the three hinder marginals projecting. Gular plates elongate, triangular, much longer than broad, the sum of their posterior angles being less than a right angle. Postgulars longer than broad. The portion of the pectoral plates which is intermediate between postgulars and abdominals is very narrow. Abdominal as broad as long. Anal plates nearly regularly rhomboidal.

In young specimens all the plates are shortened in their longitudinal diameter.

Head.—The head is covered with small polygonal horny shields, those on the upper surface of the snout and on the crown being symmetrically arranged; a single shield somewhat larger than the others may be considered as an occipital; there is an oblong shield above the tympanum. Jaws indistinctly denticulated, the front part of the upper jaw being armed with a pair of stronger prominences, and sometimes with a third single one in the middle.

Feet.—The front part of the fore legs and the hinder part of the lower hind leg are covered with rather large, prominent, flat, triangular scales. There is a group of large conical tubercles on the hinder side of the thigh.

Colour.—Head and feet yellowish, more or less marbled with brownish. This species is readily recognized by the beautiful markings of the shell; it is black, with yellow areolæ; yellow streaks radiate from the areolæ; those running towards the corners of the plates become gradually wider. The yellow streaks on the sternum are broader than those of the upper parts. The shell of *young* specimens is more simply, yet very neatly coloured; and from their system of coloration it is evident that the ground-colour of this species is yellow, the black ornamental colour in young individuals being distributed only in black spots, which are very regularly placed, namely on the middle of the sutures formed by the plates. It is probable that the young are nearly entirely yellowish when they emerge from the egg.

This species is not very scarce, and is probably found in many parts of the Peninsula of Southern India. Well-authenticated localities are Madras, Coromandel, the low jungles of the Carnatic, Pondicherry, and Ceylon. According to Mr. Blyth, it does not inhabit Lower Bengal, and is rarely brought alive to Calcutta. The shell attains to a length of 12 inches, larger specimens being very scarce.

I am indebted to Mr. Blyth for an early copy of a paper in which he distinguishes the Starred Tortoise of Lower Pegu as a separate species, which he names *T. platynotus* (Journ. As. Soc. Beng. 1863, xl). It is, he says, "very similar to *T. stellata*, but averaging a larger size, and conspicuously distinguished by being quite flat on the back, the plates not rising in the centre, and the bosses representing the appearance of having been ground flat by attrition. The radiating marks are broader and less numerous, in general numbering six only on each vertebral plate. No nuchal plate. The carapaces are used abundantly in the Rangoon bazaar for baling out oil from earthen vessels: the entire animal is difficult to be obtained, as the Burmans are so fond of eating them."

Captain Thomas Hutton has made some very valuable observations on the habits of the Starred Tortoise; and as they are the only ones which have been published on an Indian species of this genus, I give the following abstract of them:—

"These animals are by no means of rare occurrence in the hilly tracts of Meywar and the adjoining districts, where they are found in the high grassy jungles skirting the base of the hills.

"They are nevertheless not easily procured, owing to their colour and appearance being so blended with the rocky nature of the ground as to render it difficult to distinguish them from surrounding objects; added to which, they remain in concealment beneath shrubs or tufts of grass during the heat of the day.

"The Bhels, however, are expert in tracking them through loose soils, and having discovered a foot-print in the sand of a nullah or the dust of the grass plains, they generally succeed in capturing the animal by patiently following the traces it has left.

"It is in the rainy seasons that they are in the greatest activity, and wander about all day feeding and coupling. At the approach of the cold weather they select a sheltered spot and conceal themselves by thrusting their shell into some thick tuft of grass and bushes, the better to protect them from the cold, remaining thus in a sort of lethargic inactivity (for they are not torpid) until the hot season, at which time they only remain concealed during the heat of the day, coming out about sunset to feed.

"As I have several of these animals alive, I shall give an outline of their general habits in a state of confinement. I have at different times procured seven of these creatures, three of which are females, and are easily distinguished by their larger size. They were all turned loose into a large enclosure, and well supplied with water and grass, both dried and green, and a heap of bushes and grass to hide themselves in.

"Throughout the hot season they remained all day in concealment, coming out a little before sunset to feed on the grass, lucern, or cabbage-leaves which were thrown to them. As night approached they did not again retire, but, as if enjoying the coolness of the air, remained stationary until morning, when they withdrew to their retreats before the sun rose. They did not wander about during the night, but remained as if asleep.

"At this season they were fond of plunging into water, where they would often remain for half an hour at a time; this, too, generally had the effect of making them void their excrement, which appeared to be hard, oblong masses of ill-digested food, vegetable fibres, and along with it a small quantity of chalky substance (urine).

"They drank a great quantity of water, which they took by thrusting in the head and swallowing it by draughts. As the rainy season set in they became more lively, and were to be seen during the day wandering about in the rain, feeding freely and resting at intervals, and frequently performing the rites of love. Often, indeed, two or three males succeeded each other with little intermission, without appearing to inconvenience the female, who lay quite still, cropping the grass within her reach. The male mounts on the back of the female like other quadrupeds, placing his fore legs on the top of the carapace, while his hind legs rest on the ground. They remain engaged for ten minutes or a quarter of an hour, the male uttering at intervals a groaning sound. They are not, however, attached after the operation, as is said to be the case, but the desire of the male being appeased, he retires to rest and feed. During the whole period of the rains the females continued to admit the males frequently, i.e. from the latter end of June till the middle of October, being nearly four months, when they became less familiar and drew off from each other.

"On the 11th November, 1835, one of the females commenced sinking a pit to receive her eggs, which she performed in the following manner:—Having selected a retired spot at the root of a tuft of coarse, tall grass, she began to moisten the earth with water which she produced from the anus, and then with the strong horny toes of her hind feet proceeded to scrape away the mud she had made. She used her hind feet alternately, and as she proceeded the water continued to be supplied drop by drop, so as to render the earth of a thick, muddy consistency, and easy to be scraped out of the pit she was making.

"In about two hours she had succeeded in making a hole six inches in depth and four inches in diameter; in this she immediately deposited her eggs, four in number, filling up the hole again with the mud she had previously scraped out, and then treading it well in, and stamping upon it with her hind feet alternately until it was filled to the surface, when she beat it down with the whole weight of her body, raising herself behind as high as she could stretch her legs and suddenly withdrawing them, allowing herself to drop heavily on the earth, by which means it was speedily beaten flat; and so smooth and natural did it appear that, had I not detected her in the performance of her task, I should certainly never have noticed the spot where she had deposited her eggs. She did not immediately leave the place after finishing her work, but remained inactive, as if recovering from her fatigues.

"In about four hours she had dug the hole, deposited her eggs, replaced the earth, and retired to feed.

"As the cold season approached they became more sluggish, seldom leaving their retreats, and at the beginning of December 1833 they remained altogether motionless, refusing to feed. They make no attempt to burrow in the ground, as the Greek Tortoise (*Testudo graeca*) is said to do, but thrust themselves in amongst the coarse grass which was heaped up in a corner of their enclosure. Until the 9th of February 1834 they remained in a state of lazy, listless repose, having never stirred from the spot they had chosen full two months before. They were not, however, in a state of torpidity, but merely lying inactive.

"The 9th, 10th, and 11th days of February being cloudy, with a few showers of rain, the tortoises came forth and took some lucern, and drank plentifully of water. They did not continue to come out, but relapsed into their former repose; nor did they venture forth again in the evening until the hot season had commenced, or about the middle of April. The winter of 1834 proved much milder than that of the preceding year, and the tortoises in consequence continued to come forth for their supply of food; but

instead of doing so in the evening as in the hot weather, they chose the middle of the day, remaining out for two or three hours basking in the sun, and retiring again to concealment in the afternoon.

"The marking of the shells is the same in both sexes, and they are only to be distinguished by the difference in size and structure of the sternum and in the unequal length of tail, that of the male being about twice the length of that of the female—the latter, indeed, possessing almost none.

"The eggs of this tortoise are pure white, of an oblong-oval form, the ends being of equal size, and not smaller at one extremity as in the eggs of birds. The shell is thin, and 1 inch 8 lines in length by 4 inches in lateral girth.

"As they increase in age they lose the beautiful radiated appearance of the shell; and, indeed, it frequently peels off in scales even when they are in their prime. I have an old male which has lost its yellow rays, or rather which has lost the whole of the outer coating of the shell and is now of a dirty yellowish colour, the carapace being cracked and divided so irregularly as to render it somewhat difficult to recognise the true division of the scutella.

"These animals when handled will generally, either from fear or as a means of defence, squirt out a quantity of water, in a pretty strong stream, from the anus.

"I have read that the combat of the males may be heard at some distance, from the noise they produce in butting against each other. This was never the case with this tortoise, though mine had frequent fights; but these, instead of butting, consisted merely in trials of strength, one male confronting the other, with the head and fore legs drawn into the shell and the hind feet planted firmly on the ground, and in this manner shoving against each other until one or both became fatigued. This was done chiefly when they wanted to pass each other in any narrow space, and sometimes if the one could succeed in placing his shell a little beneath the other he tilted him over on his back, from whence he had great difficulty in recovering himself; and I have frequently found them sprawling thus, making desperate efforts with head and feet to throw themselves back to their natural position, which they were unable to effect unless the ground chanced to be very uneven so as to assist them.

"In this kind of warfare the females also frequently indulged, and from their superior size and strength generally accomplished their wishes.

"Soon after my arrival at Simla, in March, the old male died from cold; the others lived through the rain well enough, but were not so lively as in the plains, moving about less frequently. One of the females even produced four eggs, but made no hole to receive them as in the former case, showing plainly that the change of climate was at work upon them. She died in the course of the winter."

TESTUDO HORSFIELDII. *Afghan Tortoise.*

Testudo horsfieldii, Gray, *Catal. Tort.*, *Crocod.*, &c., 1844, p. 7, and *Catal. Shield Rept.* p. 7. tab. 1. *Günth. Proc. Zool. Soc.* 1861, p. 214.

Homopus burmesii, Blyth, *Journ. As. Soc. Beng.* xxii. 1854, p. 642.

Form.—The greatest depth of the shell is one-half of its length, and equal to the width of the sternum between the front incisions. The sternum is one-eighth broader posteriorly (between the hind incisions) than anteriorly. Anterior and posterior profiles rather truncated, the two lateral ones straight, slightly convergent towards the front.

Plates.—Arcolæ of the vertebral plates behind the centre, of the costal plates in the upper posterior corner, of the lateral marginal plates in the lower posterior corner, whilst those of the hinder marginal plates occupy the centre. The nuchal plate is narrow and elongate. Gular plates elongate, triangular, much longer than broad, the sum of their posterior angles being less than a right angle. Abdominal plate rather broader than long. Anal plates

irregularly quadrangular, the anterior side being twice as long as the posterior, whilst the two lateral ones are nearly equal in length; the notch between them is triangular, with the inner angle somewhat obtuse.

Head.—The upper jaw is armed with three strong teeth anteriorly, and indistinctly denticulated on the sides; crown of the head with symmetrical shields; a large shield between the eye and the tympanal margins.

Feet.—The scales on the inner edge of the front extremities are smaller than those on the outer. Only four claws anteriorly.

Colour.—Pale, varied with blackish, especially on the lower side, the black colour being distributed in the direction of the striae of the plates.

This species is known to me only from a single specimen in the British Museum. It is found in Afghanistan, and resembles *T. græca*, the habits of both probably being alike. A drawing made from a Nepalese specimen, and presented by B. H. Hodgson, Esq., to the British Museum, appears to represent this tortoise; if the determination be correct, this species would extend to Nepal.

It has been suggested that this species is identical with *T. ibera*, Pall. Zoogr. Ross.-As. iii. p. 18, but there is nothing in Pallas's description to prove the correctness of this opinion.

TESTUDO ELONGATA. *The Burmese Tortoise.*

Testudo elongata, Blyth, *Journ. As. Soc. Beng.* xxii. 1853, p. 639. *Gray, Proc. Zool. Soc.* 1856, p. 181. pl. 9, and *Ann. & Mag. Nat. Hist.* 1861, vi. p. 218.

Form.—Shell elongate, ovate, rather broader posteriorly, flat superiorly, the three middle vertebral plates lying nearly in a plane; the lateral margins are nearly straight, the posterior slightly reverted. It is nearly twice as broad as high, its greatest depth being one-third of its length, or equal to the width of the sternum between the front incisions. The upper shell has no notch anteriorly. The sternum is truncated in front, and has a deep acutangular incision posteriorly; it is a little broader between the hinder incisions than between the anterior. The female and the young have the shell less elongate than the male.

Plates.—The plates are rather smooth, with the concentric striae not very deeply marked. The areolæ of the vertebral plates are in the centre, those of the others excentric. There is a very long and narrow nuchal plate; the last vertebral is as broad as the caudal. Gular plates broader than long, the sum of their posterior angles being more than a right angle. Postgulars rather longer than pectorals. Abdominal as broad as long. Anal plates triangular, entirely separated by a deep notch.

Head.—The upper jaw is armed with three sharply prominent teeth, separated by two vertical grooves running upwards to the nostrils. There are three shields on the upper

surface of the crown, distinguished from the others by their large size,—namely, a pair of frontals extend from the nostrils to the interorbital space, forming a suture with the third—a large triangular vertical shield; the supraciliary region and the crown are covered with small irregular shields. A large elongate shield covers the temple, above the tympanum.

Tail.—Short, thick, terminating in a strong claw.

Feet.—Fore foot and sole of the hind leg covered with scales of moderate size; only those along the outer margin of the fore foot are larger and prominent; five short claws anteriorly and four posteriorly.

Colour.—Shell yellowish, the areolar regions of the plates black; each abdominal plate with a large black blotch in the middle. Head and feet brownish, marbled with yellowish and black.

This species attains to a length of 13 inches; it is found in Gamboja, Arakan, and Mergui.

Second Family.

THE FRESHWATER TORTOISES—*EMYDIDÆ*.

Shell sometimes convex, generally more or less depressed. Toes distinct, webbed; feet for walking and swimming; claws 5(4)—4. Shell with horny shields; caudal shields separate.

Although the species of this family may be easily distinguished from those of the preceding by the characters indicated, there is a gradual transition from the Land Tortoises proper to those the habits of which are thoroughly aquatic. The first six genera appear to live as much on land as in water. The degree of the development of the webs indicates their power of swimming. They are found near, or in, the fresh waters of nearly all the temperate and tropical regions. The females deposit about thirty eggs with a hard shell.

The following genera are found in the East Indies:—

- * Pectoral plates narrow, far apart, not forming a suture together *Manouria*, p. 10.
- ** Sternum divided into two moveable lobes by a transverse joint *Cuora*, p. 11.
- *** Sternum not divided by a transverse joint; the bridge between the upper shell and the sternum is very flat, scarcely convex, the latter being fixed to the former by a cartilaginous longitudinal suture.
- The suture between the pectoral and abdominal plates curved *Cyclemys*, p. 15.
- The suture between the pectoral and abdominal plates straight; fingers and toes scarcely webbed *Pyrridea*, p. 16.

- The suture between the pectoral and abdominal plates straight; fingers and toes broadly webbed *Notochelys*, p. 17.
- **** Pectoral plates forming a suture together; lobes of the sternum immoveable; the bridge between the upper shell and sternum is broad and very convex, and the suture between them is osseous; head of moderate size; tail short. Only the hind toes are moderately webbed *Geoemyda*, p. 18.
- Toes broadly webbed; a broad suture between the third and fourth vertebral shields; claws strong' *Emys*, p. 21.
- The third and fourth vertebral shields are pointed at their junction; claws of moderate size *Pangshura*, p. 33.
- Claws feeble *Batagur*, p. 37.
- ***** Head very large, tail very long *Platysternum*, p. 42.

MANOURIA, Gray.

Thorax and sternum solid, entirely bony, united into an immoveable case; the upper shell depressed; sternum concave in males, flat in females; pectoral plates narrow, triangular, far apart, not forming a suture together. Feet with the toes very distinct and with the hind toes webbed. Claws five anteriorly and four posteriorly.

Nothing is known about the habits of this Tortoise; it appears to be an intermediate form between the true Land Tortoises and the Terrapens.

MANOURIA EMYS. *The Brown Tortoise.*

- Testudo emys*, Müll. & Schleg. *Verhand. Nat. Geschied., Rept.* p. 34. tab. 4.
Manouria fusca, Gray, *Proc. Zool. Soc.* 1852, p. 133, and *Shield Rept.* p. 16. tab. 3, and *Proc. Zool. Soc.* 1860, p. 895, *Rept.* pl. 31.
Testudo phayrei, Blyth, *Journ. As. Soc. Beng.* xxii. 1853, p. 639.
Teleopus luxatus, Leconte, *Proc. Acad. Nat. Sc. Philad.* 1854, p. 187.

Form.—Shell rather depressed, much broader than high, truncated anteriorly, of sub-quadrangular shape, the lateral corners being somewhat prominent, and the lateral margins between them nearly straight. Its greatest depth is a little more than the distance between the axillary and inguinal incisions, and less than the width of the sternum between the front incisions. The anterior and posterior margins of the shell are much reverted. The plates are smooth and polished, each with its centre more or less deeply sunk in. The sternum is obtusely pointed in front and deeply notched posteriorly; its width between the front incisions is nearly equal to that between the hinder.

Plates.—The areolæ of the second, third, and fifth vertebral and of the second and third

costal plates are in the centre, whilst those of the first and fourth vertebral and costal plates are excentric, approximate to the middle of the whole shell. The nuchal plate is broad; the last vertebral as broad as the caudal, which is divided into two by a longitudinal groove and notched posteriorly in the middle. Nuchal plates broader than long. Gular plates irregularly quadrangular, longer than broad, the sum of their posterior angles being more than a right one; the postgulars form a broad suture with a part of the anterior margin of the abdominals, and are twice as large as the pectorals, which are widely apart. Abdominals as long as broad. Anals subrhomboid, the notch between their posterior edges being obtusangular; their inner edges form together a suture along the whole of their length.

Head.—Of all the Indian specimens which I have seen, only the shell has been preserved, so that I am obliged to give the description of the head, &c. from an Australian example, the shell of which, however, perfectly agrees with those from the East Indies. The upper jaw has no distinct denticulations. A pair of nasal and a pair of frontal shields, a vertical and a temporal shield are distinguished by their larger size from the other small ones.

Tail very short.

Feet.—The forearm and the sole of the hind leg are covered with very large, projecting, triangular scales, each transverse series on the front part of the forearm being formed by three scales. *Five claws anteriorly, four posteriorly.* Three large conical spines on each side of the tail below the hinder marginal plate, the middle spine being much the strongest.

Colour.—Nearly uniform dark horn-brown.

This species grows to a rather large size, the shell of a specimen in the British Museum being $19\frac{1}{2}$ inches long, 14 inches broad, and $7\frac{1}{2}$ inches deep. It is found at Pinang, in Arakan and the Tenasserim Provinces, in Java and Sumatra. A fine specimen in the collection mentioned has been brought, on good authority, from the Murray River in Australia! Nothing is known of its habits.

CUORA, *Gray.*

Upper shell entirely bony. Sternum very broad, attached to the upper shell by a ligamentous suture, and divided by a similar transverse suture into two moveable lobes; the cross suture corresponds to the middle of the sterno-costal suture; sternum concave in males, flat in females. Feet with the web more or less developed, and with the front part covered with very large scales. Claws strong, five anteriorly and four posteriorly.

The Indian Box Tortoises have been separated generically by Dr. Gray from those of America, with which they have great resemblance in external appearance and in habits. They belong to the intermediate forms between *Testudo* and *Emys*; although they are less aquatic in their habits than the latter, yet they are exclusively carnivorous. They are very timid, withdrawing the head and limbs when handled, and partly closing the aperture with the moveable lobes of the sternum, a faculty which they possess in a less degree than the American species. They never attempt to bite, and soon become accustomed to confinement, withdrawing their head only when frightened.

Analæ without notch behind.	Toes distinctly webbed	<i>C. amboinensis</i> , p. 12.
Analæ without notch behind.	Toes scarcely webbed	<i>C. flavomarginata</i> , p. 13.
Analæ separated by a notch behind	<i>C. trifasciata</i> , p. 14.

CUORA AMBOINENSIS. *The Báning or Cuoro.* (Plate IV. figs. A & B.)

- Testudo amboinensis*, Daud. *Rept.* ii. p. 309.
Cistudo amboinensis, Gray, *Ill. Ind. Zool.* tab. *Dum. & Bibr. Erpét. gén.* ii. p. 215. pl. 15. fig. 2.
Terrapene bicolor, Bell, *Zool. Journ.* ii. p. 484. tab. 16.
Cuora amboinensis, Gray, *Shield Rept.* p. 41.

Form and Plates.—The general form and the shape of the single plates are subject to numerous variations, some dependent on age, others apparently accidental. The shell is, generally, not depressed; we have seen only one male, from the Island of Gilolo, in which it might be so called. The most convex and elevated part of the shell is more frequently in its posterior half than in the middle. Young specimens always show three longitudinal ridges, the lateral of which are nearer to the median ridge than to the outer margin of the shell; these ridges become indistinct with age or disappear entirely. Margin of the shell not serrated, slightly reverted in young specimens. Nuchal plate oblong; caudals longer than broad, with a very slight notch behind. Sternum concave in males, flat in females, rounded anteriorly and posteriorly; the length of its anterior lobe is contained once and a third or once and a half in that of the posterior; the suture between both lobes corresponds to the suture between the fifth and six marginals. Gulars rounded anteriorly, much longer than broad, the suture between them being thrice as long as that between the postgulars. Pectorals shorter than abdominals. *Analæ large, as large as postgulars, rounded, and without notch behind;* the suture between them equals in length that between the abdominals.

Head covered with undivided skin; jaws scarcely denticulated, upper jaw slightly bent downwards anteriorly. *Tail* shorter than the head. Front part of the *fore leg* and upper side of the toes with large imbricate scales; fingers and toes webbed; claws stout, five anteriorly and four posteriorly; a series of four or six large rounded scales across the wrist.

Colour.—Upper shell brown; *each plate on the lower side with a black or brown blotch in the areolar corner;* these spots occupy the greater portion of the plates in young individuals.

Sides of the head with yellow bands: the upper runs from the nose through the upper margin of the orbit along the neck; the second passes the lower half of the orbit and the tympanum, and occupies the whole lower half of the neck. Jaws yellow, each with a black longitudinal stripe.

This species attains to a length of 8 inches; it is found in nearly all the tropical parts of India, at least near the coasts; we are not aware how far inland it may be found. Specimens have been received from Pinang, Singapore, the Tenasserim Provinces, Gamboja, Sumatra, Java, Amboyna, Gilolo, and the Philippine Islands. The Malays of the Peninsula call it *Báning*. It is more terrestrial in its habits than aquatic.

Figures A, A' of Plate IV. represent an adult female, of half the natural size; figures B, B', a young individual, of the natural size.

CUORA FLAVOMARGINATA. *The Black-bellied Box Tortoise.* (Plate V. fig. A.)

Cystoclemys flavomarginata, Gray, MS.

Form and Plates.—Shell very convex, with the margin slightly reverted and not serrated, and with three longitudinal ridges which become more or less indistinct with age. Nuchal plate narrower in front than behind; caudals longer than broad, without notch behind. Sternum rounded in front and behind, the length of its anterior lobe being two-thirds of that of the posterior; the suture between both lobes corresponds to the suture between the fifth and sixth marginals. Gulars about twice as long as broad, the suture between them being more than twice as long as that between the postgulars. Pectorals rather shorter than abdominals. *The anals are large, but rather smaller than the postgulars;* they are grown together, and the suture between them has nearly entirely disappeared.

The *head* is large; jaws not denticulated, the upper bent downwards anteriorly. *Tail* nearly as long as the head; its posterior half is covered by four rows of square shields arranged in rings. The *fore leg* is covered with very large imbricate scales anteriorly and posteriorly. Neither the fingers nor the toes are webbed; claws short.

Colour.—Upper shell blackish brown, the areolar portion of each plate light horny-coloured; lower part of the marginal plates yellowish. *Sternum entirely black, with a narrow yellow border.* Crown of the head greenish olive; a bright yellow band, edged with blackish, narrow in front and broader behind, runs from the upper posterior angle of the orbit to the side of the occiput; *snout without any band;* cheeks yellowish, with a blackish border above; neck uniform yellowish olive; feet dirty greenish olive; tail yellowish, with a blackish streak on each side.

The shell of this species attains to a length of $7\frac{1}{2}$ inches. We have two adult specimens: one is said to be from China; the other was brought by Mr. Swinhoe from Tamsuy,

N.W. Formosa. It is singular that large portions of the shell are eroded in both; but whether it is owing to an internal disease of the bones, or the effect of the action of a parasite, we do not know.

The figures are taken from the typical specimen from Formosa, and represent it of half the natural size.

CUORA TRIFASCIATA. *The Chinese Box Tortoise.*

Cistudo trifasciata, Gray, *Syn. Rept.* p. 19; *Illustr. Ind. Zool.* tab.

Sternotherus trifasciatus, Bell, *Zool. Journ.* ii. p. 299. tab. 13.

Form and Plates.—Although this species also is subject to variations in general form, it is less so than *C. amboinensis*. It is generally depressed, with the back flattened to the last vertebral plate, which is obliquely situated. Normally it has three longitudinal ridges, the costal ridge being nearly twice as remote from the lateral edge of the shell as from the vertebral ridge. The anterior half of the shell is contracted, the posterior widened, its hind margin being not, or scarcely, serrated; lateral margin slightly reverted. The nuchal plate varies in form, and is sometimes entirely absent. Vertebrae of moderate length and width. Sternum rounded anteriorly and posteriorly; the length of its anterior lobe is contained once and a third in that of the posterior; the suture between both lobes corresponds to the fifth marginal plate. Gulars rounded anteriorly, much longer than broad, the suture between them being nearly thrice as long as that between the postgulars. Pectorals as long as abdominals. *Anal* large, as large as postgulars, rounded, and separated by a notch behind.

Head covered with undivided skin, narrow and elongate; jaws not denticulated, upper jaw slightly bent downwards anteriorly. *Tail* as long as the head. Anterior and posterior parts of the *fore leg* covered with large, imbricate, shield-like scales. Fingers and toes webbed; claws strong and long, five anteriorly and four posteriorly.

Colour.—Upper shell brown, with the ridges black; lower half of the marginal plates yellow, each with a black spot posteriorly. *Sternum* black, with light-brown streaks radiating from the areolæ; margin of the sternum yellow. Head yellow, with two black streaks on each side, the upper of which passes through the eye and is broader than the lower. Feet reddish.

The shell of the largest specimen in the British Museum is 7 inches long. This species appears to be limited to China.

CYCLEMYS, *Bell*.

Thorax and sternum solid, entirely bony; sternum without transverse joint; a cartilaginous longitudinal suture between sternum and upper shell. Upper shell depressed; sternum flat; the suture between the pectoral and abdominal plates curved. Toes distinctly webbed.

Only one species is known, from British India.

CYCLEMYS OLDHAMI. (Plate V. fig. B.)

Cyclemys oldhami, Gray, MS.

Form.—Shell moderately elevated, ovate, flat above, with the lateral margins slightly reverted, and with a very distinct vertebral ridge; there are traces of costal ridges, but they appear to be distinct in young individuals only. Anterior margin entire, posterior distinctly serrated. The vertebral ridge commences from the nuchal plate and is continued to the caudals. The sternum is not quite twice as long as broad, its width between the axillary incisions being equal to that between the inguinal; it is truncated in front, and has a deep incision behind.

Plates.—Nuchal plate small, much longer than broad. The first vertebral plate somewhat elongate, bell-shaped; the three middle vertebral plates as long as broad, the last broader than the caudals; the caudals separated by a grooved ridge and by a small posterior notch. Gulars subtriangular, longer than broad, the suture between them longer than between the postgulars. Pectorals longer than abdominals; the transverse suture between pectorals and abdominals is curved, with the convexity backwards. Præanals about as long as abdominals. The anals vary in form: in the specimen from Mergui they are as broad as long and rather pointed behind, whilst they are broader than long and rounded behind in a specimen from Gamboja.

Head of moderate size. Front part of the *fore limb* and heel covered with large, thin, imbricate scales. Fingers slightly, toes broadly webbed. *Tail* as long as the head. Shell brown above, indistinctly speckled and streaked with black. Sternum with black streaks radiating from the areolar portions of the shields. Head with brown dots above.

One specimen has been sent by Professor Oldham from Mergui; another was collected by M. Mouhot in Gamboja; the shell of both is 8 inches long.

Figures B, B', B'' of Plate V. represent the specimen from Mergui, two-thirds of the natural size.

PYXIDEA, *Gray*.

Thorax and sternum solid, entirely bony; sternum without transverse joint; a cartilaginous longitudinal suture between sternum and upper shell. Upper shell angular; sternum flat; the suture between the pectoral and abdominal plates straight. Legs with transverse shield-like scales above; toes scarcely webbed.

Only one species is known.

PYXIDEA MOUHOTII. (Plate IV, fig. D.)

Cyclemys mouhotii, *Gray in Ann. & Mag. Nat. Hist.* 1862, x. p. 157.

Pyxidea mouhotii, *Gray, MS.*

Form.—Shell moderately elevated, with three strong longitudinal ridges; the space between the ridges rather flat. The anterior and posterior margins serrated, the latter much more deeply than the former. The median ridge commences behind the nuchal and terminates before the caudals, and is nearly equally strong throughout its course. The lateral ridge runs over all the costals, much nearer to the vertebral line than to the lateral margin of the shell. The sternum is nearly twice as long as broad, rather narrower between the pectoral incisions than between the inguinal, truncated in front and deeply notched behind; it is very slightly concave in males.

Plates.—Nuchal plate much longer than broad, sometimes absent; the three middle vertebral plates much broader than long, the last much broader than the caudals, each of which terminates in a point, the two points being separated by a deep notch. Gulars sub-quadrangular, rather broader than long; the suture between them shorter than that between the postgulars. Pectorals shorter than postgulars and abdominals. Preanals of about the same size as the postgulars; the suture between the preanals is shorter than that between the anals, which are comparatively large, and the posterior margins of which meet at a rather obtuse angle.

Jaws not denticulated. Front part of the *fore limb* and sole of the hind limb covered with large, thin, imbricate scales. *Tail* shorter than the head. The shell is yellowish, more brown on the lateral parts.

Seven specimens were collected by the lamented Mouhot during an expedition in the Lao Mountains in Cochinchina, where he unfortunately perished. The species does not alter much with age, the shells of the different individuals being from 5 to 7 inches long.

In a half-grown specimen the anterior lobe of the sternum appears to be slightly moveable, whilst it is entirely immovable in the larger specimens.

The figure represents one of the typical specimens, of the natural size.

NOTOCHELYS, *Gray.*

Thorax and sternum solid, entirely bony; sternum without transverse joint; a cartilaginous longitudinal suture between sternum and upper shell. Upper shell angular; sternum flat; the suture between the pectoral and abdominal plates straight. Legs covered with very small scales, fingers and toes with small transverse shields. Fingers and toes broadly webbed.

Only one species is known.

NOTOCHELYS PLATYNOTA. *The Flat-backed Emys.*

Emys platynota, Gray, *Proc. Zool. Soc.* 1834, p. 54; *Illustr. Ind. Zool.* tab.

Notochelys platynota, Gray, *MS.*

Form and Plates.—This species may be very easily recognized *by its flat back, and by the increased number of vertebral plates*, of which there are six instead of five; a very young specimen $2\frac{1}{4}$ inches long, from Singapore, has seven vertebrals. The additional vertebral is intercalated between the last and the penultimate; it is very much smaller than any of the others. Each vertebral, and in half-grown specimens each costal also, has the areola elevated, these prominences forming an interrupted keel along the vertebral line. The five anterior vertebrals are much broader than long; the second, third, and fourth quite flat; the sixth polygonal, compressed into a ridge along its middle. The anterior and posterior margins of the shell are strongly serrated, the anterior less than the posterior. Sternum subtruncated in front and behind. Gulars longer than broad, the suture between them longer than that between the postgulars; pectorals and abdominals equal in length; anals subquadrangular, the suture between them being longer than one of the hind margins, which together form a nearly straight line.

Upper jaw with a pair of tooth-like prominences separated by a deep groove; the remainder not denticulated. Front part of the *fore leg* with broad band-like transverse shields, wrist and heel with large scales. Fingers and toes broadly webbed; claws elongate, strong.

Colour.—Yellowish brown above, with brown streaks radiating from the areole. Sternum yellowish, with the areolar portions more or less brown. Head yellowish, with brown specks. Neck brown, with irregular yellow lines along the sides. A half-grown specimen from Singapore has a brown spot on the areola of each costal plate, and a pair of brown spots on the same portion of the vertebrals.

The largest specimen I have seen has a shell 10 inches long. The only well-authenticated locality inhabited by this species is Singapore, whence it has been brought by Mr. Wallace.

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Cantor describes a tortoise from Pinang 19 inches long, and called *Katong* by the Malays, as *E. platynota*; but this was certainly an incorrect determination, as is evident from his description.

GEOEMYDA, Gray.

Thorax and sternum solid, entirely bony in full-grown specimens; sternum fixed, without transverse joint; the upper shell depressed, sternum concave in males, flat in females; pectoral plates subquadrangular, forming a suture together. Feet with the toes very distinct and with the hind toes moderately webbed. Claws five anteriorly and four posteriorly.

The two species of this genus are confined to the East Indies, and appear to be intermediate forms between *Testudo* and *Emys*. Nothing positive is known of their habits; they are readily distinguished from one another.

Anterior margin serrated *G. spinosa*, p. 18.

Anterior margin not serrated *G. grandis*, p. 19.

Mr. Blyth mentions a species of *Geoemyda*, *G. tricarinata* (Journ. As. Soc. Beng. xxiv. 1855, p. 714), and describes it in the following words, without mentioning whether the margin of the shell is entire or serrated:—

"Shell $5\frac{1}{2}$ by $3\frac{1}{2}$ inches; subovate, broader posteriorly: of a dark reddish-brown colour above, with three yellow longitudinal ridges which are flat and obtuse; below pale dull yellow. Claws long, stout, and considerably hooked. Soles expanded—indication of terrene habits. Dorsal shields hexagonoid; the third and fourth broader than long; the fifth approximating a triangular form, with posterior base: nuclei of costal shield placed high, and traversed by the low lateral ridge."

GEOEMYDA SPINOSA. *The Spinous Tortoise.*

Emys spinosa, Gray, *Illustr. Ind. Zool. Bell, Testud.* tab. (young).

Geoemyda spinosa, Gray, *Proc. Zool. Soc.* 1834, p. 100. *Cantor, Catal. Mal. Rept.* p. 1.

Form and Plates.—The shell of an adult specimen, 8 inches long, is nearly twice as broad as high, with a semicircular posterior margin; the angles of the front and hind marginal plates are strongly projecting, forming together a serrated edge; a longitudinal ridge along the vertebral plates is flat, but very distinct, intersected by slight swellings on the posterior margin of each plate. The younger the specimen the less elongate are the plates. The nuchal appears constantly to have a triangular shape, with a pointed angle anteriorly; the first vertebral urn-shaped, but somewhat broader than long, the third nearly twice as broad as long, the last much broader than the caudal. Each costal plate is provided with a very small tubercle on the middle of the hind margin of its arcola. Gular plates as long as broad; postgulars and pectorals of equal length; abdominals broader than long.

In a smaller specimen, $4\frac{1}{2}$ inches long, from the same locality (Singapore), a wide space between the costal and marginal plates, and another on the middle of the sternum, are not ossified. This, therefore, is a young specimen, and from its size we may conclude that specimens of 8 inches are not full-grown, as has been the belief hitherto, but that the species grows, perhaps, to the size of the specimen on which *G. grandis* has been founded. The shell is shorter and more circular than in the other specimen, with the margins reverted, and the angles also of the lateral marginal plates are projecting, forming sharp spines, whilst the front and hind marginals are sometimes armed with two or three spines. One or two of the hinder vertebrals may be divided into lateral halves, and each costal plate has a small but very distinct spine at the place which is occupied by a tubercle in the larger example. Gular plates terminating in a small spine pointing obliquely outwards.

Head.—The upper jaw is armed with two tooth-like points anteriorly, separated by a groove, and is not denticulated on the sides. The upper part of the snout and crown is covered by an undivided hard skin, which is probably leathery in a fresh state; a temporal shield between eye and tympanum.

Tail very short.

Feet.—The forearm and the sole of the hind foot are covered with large, rather thin scales; no spines on the side of the vent. Claws strong, five anteriorly and four posteriorly; the fifth hind toe is small and rudimentary. Hind toes with a very distinct web.

Colour.—Upper part of the shell and the soft parts brown. The specimens from Singapore show a yellowish spot on each side of the neck, which is sometimes produced backwards into a streak. The sternum shows a very characteristic coloration, the areola of each plate being yellow, whilst numerous yellow streaks radiate from the areola over the remainder of the plate, which is brown. In very young specimens, where the areola occupies nearly the whole plate, these streaks are short, and in older specimens, where the epidermis is more or less worn off, only traces of them remain.

This species is known to occur in the Malayan Peninsula (Pinang, Singapore) and in Sumatra. Its habits are aquatic, as is proved by the web between the hind toes.

GEOEMYDA GRANDIS. (Plate I., and Plate II. figs. A & B.)

Emys siamensis (Gray, MS.), Günth. Proc. Zool. Soc. 1860, p. 114.

Geomyda grandis, Gray, Ann. & Mag. Nat. Hist. 1861, vi. p. 218.

Form.—Shell ovate, broader than high, subtruncated anteriorly, somewhat dilated posteriorly, with the caudal extremity slightly produced backwards. The front margins are rounded and *not serrated*, the lateral straight, and the posterior strongly serrated. Its greatest depth is somewhat more than the width of the sternum between the front incisions. The plates are smooth; a flat ridge runs along the vertebral line. The shell is slightly

emarginate above the neck, and has a small, deep notch above the tail. The sternum is truncated anteriorly and deeply notched posteriorly; its width between the front incisions equals that between the hinder, and is less than one-half of the length of the sternum.

Plates.—Areolæ and concentric striæ very indistinct. Nuchal plate short, triangular. First vertebral urn-shaped; second rather broader than long; third as broad as long; fourth and fifth with the keel rather prominent, the latter broader than the caudal. Caudal divided into two by a very distinct groove. Marginal plates without any spines in large specimens. Gulars as long as broad, the sum of their posterior angles being equal to a right angle; postgulars and pectorals of equal length; abdominals broader than long; preanals as broad as long; anals rhombic, their inner margins forming a suture together and being shorter than the posterior; the angle of the notch between the posterior margins is nearly a right one.

This description is taken from the typical specimen of *Geoemyda grandis*, a very old male from Gamboja, 17 inches long, with a concave sternum. An apparently full-grown female from the same locality, 11 inches long, differs considerably in the form of the shell; but there cannot be any doubt that it belongs to the same species, having the same characteristic coloration of the sternum and the same non-serrated anterior margin of the upper shell. The shell of this specimen is much depressed, ovate, its greatest depth being considerably less than the width of the sternum. As it is much younger than the male, the areolæ and concentric striæ are very distinct. Nuchal plate elongate, triangular; sternal portion of the abdominal nearly square.

M. Mouhot, who collected these two specimens in Gamboja, has sent at the same time a third, only 3 inches long, with the shell much shrivelled in consequence of its soft condition in a fresh state. The areolæ are proportionally very large, granulated, and surrounded by only two concentric striæ. The most interesting point in the structure of its shell is, that each vertebral plate, except the first, is divided into two lateral halves, which are arranged in a zigzag line, each half overlapping the longitudinal ridge with its inner angle. Remains of this structure are sometimes indicated in old specimens of *G. spinosa* and of *Cyclemys*.

Head, tail, feet, and coloration the same as in *Geoemyda spinosa*.

The male specimen in the British Museum bears such evident signs of very old age, that we do not believe the species grows to a larger size than from 17 to 18 inches.

Plate I. represents the typical specimen, a full-grown male, one-third of the natural size; figs. A, A', A" of Plate II., an adult female, also one-third, and figs. B & B' the young, one-half of the natural size.

EMYS.

(POND TORTOISES. TERRAPENS.)

Emys, (*Brongniart*) *Cuv. Règne Anim.* ed. 1817, p. 10.

Thorax and sternum solid, entirely bony, and united into an immoveable carapace in the adult state. The upper shell more or less depressed; the third and fourth vertebral plates united by a broad suture; sternum flat in both sexes; pectoral plates subquadrangular, forming a suture together. Feet with the toes broadly webbed. Claws strong, five anteriorly and four posteriorly.

This genus is extremely rich in species, inhabiting all the temperate and tropical regions, except Australia. Formerly (between the latest geological and the historical periods) the genus had even a still greater geographical range than now, a species in a semi-fossil state being found in England* and in other European countries, where it is extinct at present. The species undergo great changes in external appearance with age, and it is almost impossible to make out the whole history of the development of a species from the isolated examples preserved in European collections; on the other hand, naturalists residing between the tropics frequently apply names to species for which they were never intended, thereby rendering their observations on the habits, development, and geographical range useless, or productive of numerous errors. Thus the history of the Indian Terrapens, in its present state, is by no means satisfactory, beyond the zoological distinction of the species, which is chiefly due to Dr. J. E. Gray.

The Terrapens cannot well exist without water; they abound in still waters and tanks in the lower parts of India; perfectly motionless, they rest on the water, with the shell and the snout raised above its surface, suddenly disappearing at the approach of danger, and darting away with the swiftness of a fish. Their pointed claws enable them to crawl easily over slippery and steep places, and to dig little holes for a small number of elongate-ovate, hard-shelled eggs, which in some species require as long a period as from eighteen to twenty months before they are hatched. They are chiefly carnivorous, and the flatter the shell, the broader the interdigital web, the more denticulated the jaws—the more aquatic and carnivorous are the habits of the Pond Tortoises. The food of the carnivorous species consists of water-insects, frogs, small fishes, small aquatic birds and mammals; whilst on the other hand they are persecuted by alligators and large fishes, and the young and eggs by numerous other animals. They are not used as food by man, the flesh of most species having a very disagreeable smell, which is also perceptible when first taken out of the water in a net or by a hook baited with meat.

* *Emys lutaria*. See Newton, *Ann. & Mag. Nat. Hist.* 1862.

They are easily kept in captivity, provided that they are placed in a tank and fed with meat cut into small pieces or with frogs. In Europe they soon succumb to the climate, which forces them into a state of hibernation, whilst in their native country they bury themselves in the mud, remaining in a state of torpor during the extreme drought.

Most of the species attain only a small size; but all are more or less ferocious, turning round with their flexible neck and trying to bite, or scratching with their sharp claws. The head and feet can be completely retracted within the carapace.

Synopsis of the Species.

- * A more or less distinct vertebral ridge; no costal ridges.
 - Each vertebral and costal plate with a chestnut-brown, light-edged, ocellated spot *E. ocellata*, p. 22.
 - Shell yellowish brown, with numerous linear dark brown specks *E. bealii*, p. 23.
 - Upper shell more or less deep brown; nuchal plate triangular, narrower in front; abdominals longer than præanals *E. thurgi*, p. 24.
 - Upper shell brown; each sternal plate with a large square black spot; nuchal plate of moderate size; abdominals shorter than præanals *E. mutica*, p. 25.
 - Upper shell brown; nuchal plate very narrow (absent); abdominals shorter than præanals *E. nigricans*, p. 26.
- ** A pair of more or less distinct costal ridges, beside the vertebral ridge; ridges without nodose prominences.
 - Shell not serrated, costal ridges indistinct; nuchal plate nearly as broad as long; each marginal plate with a brownish ocellus on the lower side *E. sinensis*, p. 27.
 - Shell with the posterior margin serrated *E. crassicolis*, p. 28.
 - Shell not serrated; the costal ridges run at an equal distance from the vertebral ridge and from the lateral edge of the shell *E. reevesii*, p. 29.
 - Shell not serrated; ridges not interrupted, very distinct; those of the costal plates are narrow, near the vertebral ridge and remote from the lateral edge of the shell *E. trijuga*, p. 29.
 - The ridges do not extend on the last plate of the vertebral and costal series; they are swollen posteriorly on the third and fourth vertebral and on the second and third costal plates *E. macrocephala*, p. 31.
- *** Shell with three ridges, each vertebral and costal plate being elevated into a nodose prominence.
 - Shell serrated behind *E. hamiltonii*, p. 32.

EMYS OCELLATA. *The Ocellated Pond Tortoise.*

- Emys ocellata*, Dum. & Bibr. *Erpét. gén.* ii. p. 329. pl. 15. fig. 1 (not good). *Blyth, in Journ. As. Soc. Beng.* xxii. 1854, p. 645, & xxiv. p. 481.
- Batagur ocellata*, Gray, *Shield Rept.* p. 36; *Proc. Zool. Soc.* 1856, p. 182. pl. 10 & 10 a.
- Emys berdmorei*, *Blyth, L. c.* 1859, p. 281.

Form.—The shell of this beautiful species is considerably elevated, subhemispherical, nearly half as high as long. *An interrupted vertebral ridge is formed by more or less distinct*

prominences on the four anterior vertebral plates; these prominences become very indistinct with age. The margin of the upper shell is entire, without serrature or notch. Plates smoothish, with reticulated lines. Front lobe of the sternum bent upwards. Sternum with an obtuse lateral ridge and with a shallow notch posteriorly; it is equally wide between the axillary and inguinal incisions, its width being rather less than one-half of its length.

Plates.—No areolæ are visible in the specimen described; the nodose protuberances on the vertebrals are near the posterior margin of the plates. *Nuchal plate oblong, more than twice as long as broad*. The four anterior vertebrals subquadrangular, more or less broader than long; the last as broad as long, narrowed in its anterior part and dilated in its posterior. Caudal shields longer than broad. Gulars longer than broad, the suture between them being equal in length to that between the postgulars. Pectorals shorter than postgulars, abdominals, or præanals. *Abdominals and præanals nearly equal in length*. The suture between the anals is much longer than their posterior margins, which meet at an obtuse angle.

The *limbs* are stout, and less depressed than in most Emydes; there are imbricate, very narrow and elongate scales on the forearm and on the posterior part of the tarsus. *Claws long, strong, and curved*. The *tail* is short, and can scarcely be exerted from below the carapace.

Colour.—Shell brownish, each vertebral and costal with a chestnut-brown, light-edged, ocellated spot. Lower parts yellow. The soft parts are olive-grey; crown of the head blackish, with a yellowish-white V-like mark over the snout, continued over each eye and over the back of the neck; another similar line behind the eye. Both lines are frequently more or less broken up into spots.

The shell from which we have taken the description is only $7\frac{1}{2}$ inches long, and apparently belonged to an adult specimen; it was brought from Mergui. Bibron mentions a specimen 12 inches long. A specimen (considered by Mr. Blyth as belonging to a different species) was obtained on the Tenasserim coast, and others at Schwe Gyeu, on the Sitang River, in Pegu. This species approaches the Land Tortoises in several characters, and probably also in habits.

EMYD BEALII. *The Speckled Pond Tortoise*.

Cistudo (?) *bealii*, Gray, *Syn. Rept.* p. 71.

Emys bealii, Gray, *Shield Rept.* p. 21. tab. 8.

Form.—Shell not much depressed, rather elongate, not emarginate or serrated, with a single longitudinal ridge, which is distinct posteriorly only. No notch between the caudals. Sternum rounded on the sides, truncated anteriorly; it is rather broader between the inguinal incisions than between the axillary, and twice as long as broad.

Plates.—The plates are remarkably smooth, polished, with the areolæ very indistinct;

nuchal plate elongate-triangular; vertebrals broader than long, not imbricate, the fourth and fifth with an obtuse and low ridge. The outer edge of the marginal plates is not reverted; caudals rather broader than long. Gulars broader than long, the suture between them equalling in length that between the postgulars; postgulars shorter than pectorals and præanals, which are equal in length; the abdominals are the longest of the sternal shields, two-sevenths or one-fourth of the length of the sternum. *Anal*s nearly as large as the *postgular*s; the suture between them is much longer than their posterior margins, which meet at a very obtuse angle.

Head covered with undivided skin; jaws not denticulated. *Tail* as long as the head.

Feet.—Fingers and toes completely webbed. *Front side of the forearm* with extremely broad scutes, occupying nearly the whole width of the arm; the outer side of the hind foot is also covered with enlarged scales.

Colour.—Shell yellowish brown, with numerous linear dark-brown specks; sternum yellow, with brown blotches. A pair of black, yellow-edged ocelli on the occiput; a scarlet, black-edged band runs along the middle of the neck; two or three similar streaks along each side of the neck.

I have seen two specimens of this well-distinguished species; both are much alike, and the larger, with a shell $5\frac{1}{2}$ inches long, appears to be fully adult. It is a native of Southern China.

EMYS THURGI. *The Thurgi.*

Emys thurgii, Gray, *Syn.* pp. 22 & 72, and *Shield Rept.* p. 21. *Dum. & Bibr. Erpét. gén.* ii. p. 318.

Testudo thurgii, Gray, *Illustr. Ind. Zool.*

Emys flavo-nigra, Less. *Bull. Sc.* xxv. p. 12, and in *Béanger, Voy. Ind. Orient., Rept.* p. 22.

Form.—Shell rather depressed, ovate; an interrupted median ridge extends the whole length of the shell; no costal ridge. The upper shell is subtruncated anteriorly and provided with a small notch posteriorly. Lateral margins not reverted, posterior scarcely serrated. The sternum is elongate, the width between the axillary incisions being two-fifths of its length. In the adult specimen the width between the axillary and inguinal incisions is equal, whilst the former is the greater in the young specimen. The young specimen has the sternum keeled on the sides, the old one perfectly rounded. The sternum is truncated anteriorly, notched posteriorly, the angle of the notch being nearly a right one.

Plates.—The areolæ are proportionally large, smooth, and seem to disappear before the animal is full-grown. *Nuchal plate* triangular, broadish posteriorly. The first vertebral rather elongate, with the posterior margin concave, the concavity being directed backwards; the last broader than long. Caudal shields square. Gulars longer than broad, the suture between them being shorter than that between the postgulars. Postgulars rather longer

than, and nearly as large as, pectorals. *Abdominal plates longer than either pectorals or præanals; præanals longer than pectorals.* The suture between the anals is longer than their posterior margin.

Head proportionate, covered with undivided skin; *upper jaw strongly denticulated*, with a pair of tooth-like prominences in front. *Tail* shorter than the head. *Feet* broadly webbed; forearm with transverse series of broad, short, imbricate scales.

Colour.—Shell more or less deep brown, the plates of the lower side edged with yellow. A broad yellow band runs from the nostrils over the eyebrows along the side of the neck, a short yellow band anteriorly on each side of the upper jaw. Feet olive, spotted with yellow.

Our description is taken from very old specimens, the shells of which are 14–16 inches long. Another specimen, 5 inches long, has the carapace not completely ossified. The species is found in the Ganges, and probably in the whole of Bengal; according to Cantor in Pinang also. The structure of its jaws shows that it is a thoroughly carnivorous and probably a rather ferocious species. According to Blyth, the species would attain to 22 inches in length of carapace (*Journ. As. Soc. Beng.* xxii. 1854, p. 643).

EMYS MUTICA. *The Chusan Terrapen.*

Emys muticus, Cantor, *Ann. & Mag. Nat. Hist.* 1842, ix. p. 482.

Form.—Shell rather depressed, with a very distinct continuous median ridge, extending from the middle of the first vertebral plate to the end of the last; no costal ridge; the nuchal region is subtruncated, the caudal with a very distinct notch. Lateral margins but little reverted. The sternum is equally wide between the axillary and inguinal incisions, its width being rather more than one-half of its length; it is subtruncated in front and deeply notched behind.

Plates.—The areolæ are distinct, situated on the posterior margins of the plates. *Nuchal plate of moderate size*, triangular, longer than broad, broadest behind. The first vertebral subpentagonal, broader than long, broader anteriorly than posteriorly; the last with the keel very distinct, and broader than the caudals; caudals broader than long. Gulars as broad as long; postgulars as long as pectorals and as abdominals; *the sternal portion of the abdominals is broader than long, and rather shorter than the præanals*; the suture between the anals is rather longer than their hind margins, which meet at a right angle. Inguinal plates extremely small.

Head proportionate; jaws not denticulated. *Tail* as long as the head. *Feet* broadly webbed; forearm with large, thin scales.

Colour.—Shell uniform greenish brown above. Sternum yellow; the areolar portion of

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each sternal plate with a large square black spot; lower parts of the marginal plates uniform yellow, without spots or ocelli. Head greenish olive, with a yellow band commencing from behind the eye.

For the determination of this species I had a coloured drawing, made by Dr. Cantor at Chusan, and kindly communicated to me by Mr. F. Moore, Custos of the East India Collection, to which the drawing belongs; and two specimens from Chusan—one in the British Museum (*E. nigricans*, spec. a, Gray, Catal. Shield Rept. p. 21), and one in the East India Collection; both specimens agree perfectly with each other, and the latter is without doubt the typical specimen from which Cantor has figured the species. It differs so constantly from *E. nigricans* in the shape of the nuchal and of the sternal plates, in the depressed shell, and in the coloration, that we cannot consider them as identical. The shell of the larger specimen is 5 inches long and 4 inches broad.

EMYS NIGRICANS. *The Blackish Pond Tortoise.*

Emys nigricans, Gray, *Proc. Zool. Soc.* 1834, p. 53, and *Shield Rept.* p. 20. tab. 6.

Two specimens of *E. nigricans* are preserved in the British Museum; the first (typical) specimen is a shell, 4 inches long, and injured behind; a peculiarity of this specimen (which has been figured by Dr. Gray) is the absence of a nuchal plate. The second specimen is a stuffed animal, the shell of which is a little larger than that of the first; it has a nuchal plate. We take our description from the second specimen.

Form.—Shell rather elevated along the *median ridge*, which is very distinct, and *extends from the nuchal to the end of the last vertebral plate*; no *costal ridge*, only the *centres of the areolæ are a little elevated*. The upper shell has a very slight notch anteriorly and posteriorly, and is scarcely serrated; its lateral margins are somewhat reverted. The sternum is a little wider between the axillary incisions than between the inguinal, its width being one-half of its length; it is truncated anteriorly.

Plates.—The areolæ are distinct, situated on or near the posterior margins of the plates. *Nuchal plate very narrow (sometimes absent)*. Vertebrae subimbricate; the first pentagonal, broader than long, broader anteriorly than posteriorly; the last with the keel very distinct, and broader than the caudals; caudals broader than long. Gulars rather broader than long; postgulars rather shorter than pectorals; the *sternal portion of the abdominal square, but shorter than the præanal*; the suture between the anals as long as their hind margins, which meet at a right angle.

Head proportionate; jaws not denticulated. *Tail* of moderate length. *Feet* broadly webbed; forearm with large, thin scales.

Colour.—Shell brown; sternum yellow, marbled with black near the margins; head and

neck blackish brown, *sides of the head and neck* with four interrupted yellow streaks; jaws and throat yellow, marbled with black.

Nothing is known of the habits of this very obscure species; it is a native of China, apparently of the southern parts.

EMYS SINENSIS. *The Chinese Pond Tortoise.*

Emys sinensis, Gray, *Proc. Zool. Soc.* 1834, p. 53, and *Shield Rept.* p. 21. tab. 7 (half-grown).

— *bennettii*, Gray, *Shield Rept.* p. 22. tab. 10 (adult).

Form.—Shell depressed, ovate, not emarginate or serrated, with three longitudinal ridges, the outer of which are very indistinct, but visible in old and young individuals; the middle is elevated, extending over the anterior and posterior vertebrals, and slightly interrupted behind each shield. The notch in the caudal is very small. Lateral margins of the upper shell slightly reverted. Sternum rounded on the sides; its breadth between the axillary and inguinal incisions is nearly equal, and contained twice and a third in its length; it is sub-truncated anteriorly, its posterior notch being rectangular.

Plates.—The areolae are finely granular; those of the vertebrals are situated on the hind margins of the plates, and divided into two by the median ridge. The costal areolae are more or less remote from the hind margin of the shields, and slightly elevated along the middle; they are nearer to the marginal shields than to the median ridge. The areolae disappear entirely in very old individuals. *Nuchal plate* subquadrangular, nearly as broad as long. The first vertebral nearly as broad as long, the last broader than long. Caudal divided. Gulars longer than broad, the suture between them being twice as long as that between the postgulars in the adult specimen. Postgular much smaller than the square pectoral. Abdominal and preanal of the same length, the former longer than broad in its sternal portion. Suture between the anals as long as their posterior margin.

Head covered with undivided skin; jaws finely denticulated in old individuals. *Tail* slender.

Feet.—Fingers and toes completely webbed. The front side of the forearm is covered with large, not prominent, scales of different size; wrist with a transverse series of four large scales on its inner side.

Colour.—Shell brownish olive dotted with brown, the ridges yellow; sternum yellow, each plate brownish towards the hinder margin. *Each marginal plate has on the lower side a large brownish ocellus edged with dark brown. Sides of the head, neck, throat, and feet with numerous narrow blackish-brown longitudinal stripes on a yellow ground.*

This species is found in the neighbourhood of Canton and on the island of Formosa*.

* Several specimens from South Formosa have been collected by Mr. Swinhoe.

The typical specimen of *E. sinensis* is $4\frac{1}{2}$ inches long, that of *E. bennettii* 10 inches; we consider the latter as the adult of the former. Although the costal ridges (which are never fully developed) have disappeared in the old specimen, the colours of the soft parts and the ocelli on the marginal plates appear to us characteristic of the species.

EMYS CRASSICOLLIS. *The Thick-necked Pond Tortoise.* (Plate IV. fig. E.)

Emys crassicollis, Gray, *Syn.* p. 21, tab. 7. fig. 3; *Illustr. Ind. Zool.* tab. . fig. 2; *Shield Rept.* p. 20. Cantor, *Mal. Rept.* p. 3.
— *nigra*, Blyth, *Journ. As. Soc. Beng.* xxiv. 1855, p. 713.

Form.—Shell depressed, oblong, with the lateral edges nearly straight, and with the posterior margin serrated. Three longitudinal ridges run along the vertebral and costal plates, but they are very low, and those of the costals become nearly obliterated with age. The plates are very smooth, with the areolæ and concentric striae obsolete. Costal ridges close by the vertebral line and remote from the lateral margins of the shell. Sternum truncated in front, its width between the front and hind incisions being nearly equal, and more than one-half of its length.

Plates.—Nuchal plate subtriangular, longer than broad. Vertebrae much contracted behind: the anterior triangular, with the posterior point of the triangle truncated; the last broader than the caudals. Upper portion of the marginal plates very narrow. Gulars as long as broad; postgulars relatively small, not longer than gulars. Pectorals, abdominals, and preanals of nearly equal length; sternal portion of the abdominal nearly square.

Head short and broad; cleft of the mouth broader than long; nose slightly protruding. *Tail* short.

Colour.—Shell uniform brownish black; head and feet brown, with several white markings—one above each eye, and another (rounded) on each side of the neck; lower jaw with a broad white transverse band. These markings appear to become indistinct with age.

This description is taken from an old example 7 inches long; the species appears to attain to a length of 10 inches. According to Dr. Cantor it feeds on frogs, shellfish, and animal offal. Well-authenticated localities in British India, where this species is found, are Mergui and the Malayan Peninsula. Specimens of this species, or of one closely allied to it, have been brought from Gamboja; the costal ridges of these specimens are very indistinct, and the postgular plates comparatively larger. The same species is said to occur also in Sumatra and Java*.

Plate IV. fig. E. represents a half-grown specimen of the natural size, said to be from Sumatra.

* The specimen mentioned by Dr. Gray as from Ceylon is an adult *E. seobr.*

EMYS REEVESII. *Reeves's Pond Tortoise.*

Emys reevesii, Gray, *Syn. Rept.* p. 73. *Dum. & Bibr. Erpét. gén.* ii. p. 313.
Geoclemys reevesii, Gray, *Shield Rept.* p. 19. pl. 5.

Form.—Shell oblong-ovate, with three longitudinal ridges, *not interrupted by nodose prominences*; it is not depressed, or emarginate or serrated; the notch in the caudal shield small, shallow. Sternum rounded on the sides, not keeled, nearly as broad between the front as between the hind incisions, the breadth between them being one-half of its length: it is truncated anteriorly, and its posterior notch is obtusangular.

Plates.—The areolæ are finely granular, situated on, or very near to, the posterior margins of the plates; those of the vertebral and costal plates are divided into two by the ridges. The costal ridges are very narrow, almost linear, but very distinct; *they run at an equal distance from the vertebral ridge and from the lateral edge of the shell.* The areolæ of the sternal plates are scarcely perceptible. Nuchal plate very short, broader than long; vertebrals broader than long, the last broader than the caudal, which is divided into two. All the marginal plates very narrow. Gulars longer than broad, the suture between the post-gulars being very short. Pectoral, abdominal, and preanal of nearly equal length, or the pectoral a little shorter than the others; sternal portion of the abdominal square. Suture between the anals longer than their posterior margin.

Head covered with undivided skin; upper jaw not denticulated. *Tail* longer than the head. *Toes* moderately webbed.

Colour.—The upper shell and the soft parts are brownish; each sternal plate with a large dark-brown blotch in the centre; two oblique yellow lines behind the eye, on the temple; neck with two longitudinal yellow lines on each side, and with one along the middle.

This small *Emys* (from 3 to 4 inches long) is a native of Southern China and CochinChina. A specimen which does not differ from a Chinese one, and which has been figured by Dr. Gray, is said to come from India.

EMYS TRIJUGA. *Common Ceylonese Pond Tortoise.* (Platc II. fig. C.)

Seba, i. tab. 79. fig. 12.
Emys trijuga, *Schweigg. Prodr.* p. 310. *Dum. & Bibr. Erpét. gén.* ii. p. 310. *Gray, Shield Rept.* p. 20. tab. 4, and tab. 37. fig. 2. *Kelaart, Prodr. Faun. Ceylon.* p. 177.
 — *sebae*, *Gray, Syn. Rept.* p. 75.
 — *thermalis*, *Reynolds, in Less. Cent. Zool.* p. 89. pl. 29 (test. *Gray*).
 — *belangeri*, *Less. in Blang. Voy. Ind. Orient., Rept.* p. 291. pl. 1 (not good).
Geoclemys seba, *Gray, Shield Rept.* pp. 18 & 77.

Form.—Shell depressed, ovate, *not emarginate or serrated, with three longitudinal ridges, which are not interrupted by nodose prominences.* The notch in the caudal shield is very

small and shallow. Sternum rounded on the sides in adult females, and angularly bent in young males; its breadth between the front and hind incisions is nearly equal, and one-half of its length; it is subtruncated anteriorly, its posterior notch being rectangular.

Plates.—The areolæ are finely granular, situated on the posterior margins of the plates; those of the vertebrae as well as of the costals are divided into two by the longitudinal ridges. The costal ridges are narrow, but very distinct, *near to the vertebral ridge, and remote from the lateral edge of the shell.* Nuchal plate longer than broad. Vertebrae as broad as long in adult specimens, rather broader in young ones; the last vertebral a little broader than the caudal, which is divided into two by a groove. Marginal plates of moderate width, with the outer edge slightly reverted in adult specimens. Gulars longer than broad, the suture between them being twice as long as that between the postgulars. Postgular and pectoral of equal length, the latter square. The abdominal plate is the longest plate on the sternum, *its sternal portion being considerably longer than broad.* Suture between the anals longer than their posterior margin.

This description is taken from the shell of an evidently old and full-grown individual, 7 inches long, sent by Dr. Kelaart from Ceylon. In a specimen $3\frac{1}{2}$ inches long the shell is shorter, broader, more depressed, and the lateral margins are much reverted. All the plates are proportionally shorter, and the abdominal is rather broader than long. Finally, in a very young specimen, 2 inches long, in which the umbilical cicatrix is still visible, the plates are very broad, the lateral margins of the shell being subhorizontal, not reverted. The notch at the sternal extremity is shallow, obtusangular.

Head covered with undivided skin; jaws not denticulated. *Tail* shorter than the head.

Feet.—Fingers and toes completely webbed; claws pointed, five anteriorly and four posteriorly. The front side of the forearm and the dorsal side of the toes are covered with large, not prominent, scales, the remainder of the limbs being granular. Wrist with a transverse series of four large scales on its inner side.

Colour.—Shell nearly uniform brown, the ridges somewhat lighter; sternum brownish black, in young specimens with broad white margins; head and feet brown, the former with numerous red or yellow spots.

This Pond Tortoise is rather common in the peninsula of India and in Ceylon, and a thoroughly aquatic and carnivorous species, as I have convinced myself by observation of a specimen living for some time in the Zoological Society's menagerie, and as may be inferred from the structure of the shell and of the feet. It appears to be full-grown at a length of from 7 to 8 inches. I cannot assure myself of the specific distinctness of the Ceylonese specimens. It is very doubtful whether this species is also found in the East Indian Archipelago. Schlegel and Duméril and Bibron mention specimens from Java; but an example in the British Museum, received from Holland with the name of *E. subtrijuga*, and probably from one of the Dutch colonies, belongs to a distinct species, which is distin-

guished from *E. trijuga* by having a broad triangular nuchal plate and by the lateral margins of the shell not being reverted.

The figures (Plate II. figs. C, C') represent a specimen of the natural size.

EMYS MACROCEPHALA. *The Broad-headed Terrapen.*

Geoclemys macrocephala, Gray, *Proc. Zool. Soc.* 1859, p. 478. pl. 21, and 1861, p. 139.

Of this beautiful species I have four specimens before me: one adult, and 8½ inches long; two half-grown, of 4 inches; and a fourth, which is only 2½ inches long, and evidently young.

Form.—Shell depressed, rounded-ovate, with three longitudinal ridges, not extending on the last plate of the vertebral and costal series, the ridges of the third and fourth vertebral and of the second and third costal being more or less swollen behind; these prominences are very distinct in young individuals. The costal ridge is twice as distant from the edge of the shell as from the vertebral ridge. The upper shell is subtruncated in front, not emarginate, and has scarcely any notch behind; it is not serrated. The sternum is equally wide between the axillary and inguinal incisions, its width being more than one-half of its length; it is truncated anteriorly.

Plates.—The areolæ are indistinct, situated on the posterior margins of the plates. Nuchal plate subtriangular—in the young specimen nearly as broad behind as long, in older specimens narrower. The two anterior vertebrals with the ridge much flattened; the last vertebral almost without keel, broader than the caudals. Caudals square. Gulars much broader than long; postgulars and pectorals of equal length; the sternal portion of the abdominal square, as long as preanal; the suture between the anals longer than their posterior margins, which meet at an obtuse angle.

Head large, broad, with the nose rather prominent and turned upwards; jaws without denticulation. *Tail* very short.

Feet webbed; forearm with very large but thin scales; wrist with two or three similar scales.

Colour.—Shell chestnut-brown; areolæ black; outer edges of the marginal plates yellow; plates on the lower side yellow, with the areolar portion black. In the young specimen the sternal plates are dark purplish red, blackish on the areolæ, the margins being of a mother-of-pearl colour. Head black, brown above; six yellow stripes radiate from the nose, one running above the eye, the second below to the angle of the mouth; the third pair descend vertically to the front incision of the upper jaw. Another yellow streak from the eye along each side of the neck. The lower jaw with a pair of longitudinal streaks running to the chin.

Habitat.—Siam, Gamboja.

EMYS HAMILTONII. *The Yellow-spotted Emys.*

Emys guttata, Gray, *Illustr. Ind. Zool.* tab.

— *hamiltonii*, Gray, *Syn. Rept.* pp. 21, 72.

— *picquotii*, Less. in *Bélang. Voy. Ind. Orient.*, *Zool. Rept.* p. 294.

Geoclemys hamiltonii, Gray, *Shield Rept.* p. 17.

Form.—The shell of this elegant little species is oblong-ovate, with three longitudinal ridges, each plate of the vertebral and costal series being elevated into a nodose prominence. The upper shell is slightly emarginate in front, and has a small notch between the two portions of the caudal plate; its hinder margin is very distinctly serrated. The sternum has an obtuse lateral keel between the axillary and inguinal incisions; it is wider between the front than between the hind incisions, its breadth between the former being one-half of its length.

Plates.—The areolæ are proportionally large, rugose, situated on the posterior margin of the plates. The nodose protuberances of the vertebral and costal ridges occupy the centre of the areolæ. Nuchal plate subtriangular, as broad as long; the last vertebral a little broader than the two caudals; eleven marginal plates on each side; preanal as long as abdominal.

Head short, covered with soft skin; tympanum coated over with coloured skin; jaws not denticulated, the upper without prominence anteriorly. *Tail* thin, shorter than the head, covered with minute spinous tubercles to its extremity.

Feet.—Forearm with thin, broad, rounded scales. Fingers and toes broadly webbed; five claws anteriorly and four posteriorly.

Ground-colour brownish black, each vertebral and costal plate with a yellow spot on the middle of its areola; three or four other spots on the margin, ray-like disposed; marginal and sternal plates similarly spotted. Head, neck, and limbs with yellow spots and dots, those on the head being the largest; a pair of these spots in front of the eye are very constant. Iris black, with yellow spots.

This species is common in the lower Ganges and its vicinity. The specimens brought to Europe are usually from 2 to 3 inches long; it attains, however, to a length of $5\frac{1}{2}$ inches. I have only seen it once, alive, in Europe (Zoological Gardens, Regent's Park); it appeared to be much affected by the climate, and died after a short time. It feeds on animal substances—in captivity on raw meat.

PANGSHURA, *Gray*.

Thorax and sternum solid, entirely bony, united into an immoveable carapace; the upper shell is angularly elevated, compressed; the fourth and, generally, the third vertebral plates are pointed at their junction. Sternum flat in both sexes; pectoral plates subquadrangular, forming a suture together; caudal divided into two. Feet with the toes broadly webbed. Claws of moderate size, five anteriorly and four posteriorly.

This genus is confined to the Indian Continent, and the species known do not appear to differ in habits from the *Emydes* proper.

Synopsis of the Species.

* The third vertebral tapering behind.

The lower parts of the shell yellow, with large blackish-brown spots . . . *P. tecta*, p. 33.

Sternal plates blackish brown, with rosy margins *P. tentoria*, p. 34.

Sternum uniform yellowish *P. flaviventer*, p. 35.

** The third vertebral truncated behind.

The third vertebral quadrangular, rectangular *P. smithii*, p. 36.

PANGSHURA TECTA. *The Pangshure.*

Emys tecta, *Gray, Syn. Rept.* p. 23. tab. 25; *Illustr. Ind. Zool. c. fig.* *Bell, Testud. c. tab.*

— *trigibbosa*, *Less. in Bélang. Voy. Ind. Orient., Rept.* p. 29.

Batagur tecta, *Gray, Shield Rept.* p. 36.

This species, which is common in the Ganges and other rivers of Bengal, may be easily distinguished by its elevated back, by the form of the first vertebral shield, and by the coloration of the sternum. A more or less distinct ridge runs along the middle of the vertebral plates, and is interrupted by nodose prominences, of which that of the third vertebral is the strongest, forming the highest point of the shell; its greatest depth is rather more than one-half of its length. *The first vertebral is pentagonal, the hinder side being the shortest*; the fourth cuneiform, tapering anteriorly; hind margin of the shell slightly serrated; sternum with a distinct angular ridge on each side. Head covered with undivided skin; jaws obtusely denticulated, the upper not notched in front. Tail shorter than the head.

Shell brownish or blackish; vertebral ridge yellowish, edged with black; head with two

broad orange converging streaks, neck with numerous yellowish longitudinal lines; legs with yellowish dots. *The lower parts of the shell yellow, with large blackish-brown spots.*

The shell of the largest specimen I have seen is 5 inches long; specimens 6 inches long are on record.

PANGSHURA TENTORIA. *The Dura.* (Plate IV. figs. C, C'.)

Emys tectum (adult), Gray, *Illustr. Ind. Zool.* figs. 3-5.

— *tentoria*, Gray, *Proc. Zool. Soc.* 1834, p. 54.

Batagur tentoria, Gray, *Shield Rept.* p. 37.

The *Dura* is very similar to the *Pangshure*, from which it may be readily distinguished by its shell, which is somewhat more depressed, its greatest depth being less than one-half of its length.

Plates.—Nuchal plate short, broadish, subquadrangular, broadest behind. The vertebral plates are raised along their median line into a ridge, which is most distinct on the middle of the back, terminating in a nodose prominence on the third, and sometimes on the second vertebral. *The first vertebral is subquadrangular, as broad posteriorly as anteriorly; the second and third are rounded behind and narrowed; the fourth is cuneiform, tapering anteriorly; the fifth more than twice as broad as the caudals.* Caudals much longer than broad, separated by a groove and by a very small notch. Hind margin of the upper shell distinctly serrated. Sternum flat, keeled on the sides, rather elongate, its width between the inguinal incisions being less than one-half of its length. Gulars longer than broad, the suture between them being shorter than that between the postgulars. Pectorals shorter than postgulars, abdominals, or præanals; the suture between the anals is longer than their posterior margins, which meet at an obtuse angle.

Head covered with undivided skin; jaws finely denticulated, the upper jaw not emarginate anteriorly. *Tail* rather shorter than the head. *Feet* broadly webbed; front part of the fore leg and base of the fifth toe with large imbricate scales; claws of moderate size.

Colour.—The upper shell is uniform brown; *the sternal plates blackish brown with yellow margins.*

The only specimen known in European collections* was brought from the Deccan by Colonel Sykes, and is $6\frac{1}{2}$ inches long; it does not appear to be adult, as the shell is not entirely ossified. A second specimen, of nearly the same size, was obtained at the Indus by Sir A. Burnes, and is now in the Museum of the Asiatic Society at Calcutta. Mr. Blyth (*Journ. As. Soc. Beng.* xxii. 1854, p. 643) mentions that he has met with one young specimen

* The two half-grown specimens mentioned by Dr. Gray in the 'Catalogue of Shield Reptiles' are probably the young of *Batagur dhongoka*.

in the vicinity of Calcutta. This we doubt, as the species may be easily confounded with young specimens of the Batagur and of the species allied to it.

W. Elliott, Esq., has found this species on the banks of the Kistna and its tributaries, where it is called by the natives *Gunangi mek'ham*. The beautiful drawings made from live specimens which are in the possession of that gentleman represent the shell nearly uniform brownish olive, and the sternal plates blackish with rosy margins; neck and legs alternately striped with greenish and blackish; hinder part of the thighs with similar transverse bands. A series of three or four red spots across the occiput.

The figures C, C' of Plate IV. represent the typical specimen, of half the natural size.

PANGSHURA FLAVIVENTER.

This species is easily distinguished from the two preceding by its bell-shaped first vertebral plate and by its uniform yellowish sternum. It resembles much in form the *P. tecta*, but is rather more elevated, having a large impression in the middle of the second and third costal plates.

Plates.—Nuchal plate rather broader than long, broader behind than in front. The vertebral plates are raised along their median line into a ridge, which terminates in a slight



nodose prominence on the second of these plates, and in a strong one on the third. *The first vertebral shield is bell-shaped, longer than broad, and broadest behind; it has six sides: the anterior, in contact with the nuchal, is the shortest; the next following pair, in contact with the first marginal, are also short; the lateral pair, in contact with the costal, is S-shaped, and rather long; finally, the hinder side is the longest, nearly straight, forming a broad suture with the second vertebral plate; the second and third vertebrals are rounded behind and narrowed; the fourth is much elongate, pear-shaped, tapering anteriorly; the fifth is more than twice as broad as the caudals. Caudals longer than broad, separated by a very small notch. Hind margin of the upper shell not serrated. Sternum flat, slightly bent upwards anteriorly, keeled on the sides, rather elongate, its width between the inguinal incisions being one-half of its length. Gulars nearly as broad as long, the suture between them being rather more than one-half of that of the postgulars. The transverse sutures between post-*

gulars and pectorals are much directed backwards, forming together an angle of about 130° . Pectorals shorter than postgulars, abdominals, and preanals: the suture between the anals is longer than their hind margins, which are separated by a semicircular notch.

The *soft parts* are similar to those of *P. tentoria*.

The shell is uniform horny brown above, the ridge lighter, the nodose prominences darker. Lower parts uniform yellowish, with the exception of the marginal plates, each of which has a brown blotch on its lower side. No markings are visible on the soft parts in the single stuffed example known.

I am indebted for the knowledge of this species to Mr. F. Moore, Custos of the East India Collection, who kindly allowed me to examine the Reptiles under his charge. It is founded on a well-preserved, stuffed example, the shell of which is 8 inches long. No other record has been kept of this specimen, except that it had been sent by Mr. McClelland; several other Tortoises sent by the same gentleman, at the same time, are Bengal species.

PANGSHURA SMITHII. (Figure, see p. 2.)

Batagur smithii, Gray, MS.

Form.—Shell ovate, slightly depressed, with a very distinct vertebral ridge, which extends from the nuchal to the caudal plate, and terminates in an elongate prominence on the third plate. The sternum is flat, its width between the inguinal incisions being rather more than that between the axillary, and rather less than one-half of its length; it is rounded in front. Upper shell slightly serrated posteriorly.

Plates.—Nuchal plate small, rather longer than broad, broader behind than in front. The first vertebral shield is bell-shaped, scarcely longer than broad, and broadest behind; the second is subquadrangular, much broader than long; the third is rectangular, oblong, two-thirds as broad as long; the fourth is much elongate, pear-shaped, tapering anteriorly. Gulars considerably longer than broad, the suture between them being two-thirds of that between the postgulars. The posterior margins of the postgulars are strongly convex, forming a deep curve. The abdominals are nearly as large as the postgulars and pectorals together, the latter being scarcely longer than the anals.

The soft parts do not show any peculiarity. The upper shell is yellowish, with a part of the vertebral keel blackish. The lower parts are blackish, each plate with yellowish margin.

The typical specimen of this species is stuffed; shell 7 inches long, and perfectly ossified; it is not known from what country it came, but it probably occurs in continental India, like its congeners. A smaller example, from the River Chenab (Punjab), has been referred to this species by Dr. Gray, but it differs in several important points; and the plates being deformed in many places, I hesitate to give a description of it.

BATAGUR, *Gray*.

Thorax and sternum solid, entirely, or nearly entirely, bony in full-grown specimens, united into an immoveable carapace; shell depressed. Sternum flat in both sexes; pectoral plates subquadrangular, forming a suture together. Feet with the toes broadly webbed; claws feeble.

This genus is confined to the East Indies; its species grow to a considerably larger size than the *Emydes* proper, but have the same habits.

Synopsis of the Species.

- * Four claws anteriorly *B. baska*, p. 37.
- ** Five claws anteriorly.
- Posterior margin of the shell not serrated; the hind margins of the postgulars meet at an obtuse angle; shell of uniform colour *B. lineatus*, p. 39.
- Posterior margin of the shell strongly serrated; vertebral ridge interrupted by prominences. The hind margins of the postgulars meet at an obtuse angle *B. ellioti*, p. 40.
- Nuchal plate none; first vertebral broader than long *B. affinis*, p. 40.
- First vertebral longer than broad. The hind margins of the postgulars form a straight line; upper shell with three black streaks *B. dhongoka*, p. 42.

BATAGUR BASKA. *The Batagur*. (Plate III. figs. B, B'.)

Emys batagur, *Gray*, *Syn. Rept.* p. 23, and *Illustr. Ind. Zool.* tab.

— *baska*, *Gray*, *Illustr. Ind. Zool.* tab.

Trionyx cuvieri, *Gray*, *Syn. Rept.* p. 50 (very young?).

Tetraonyx longicollis, *Less.* in *Bélang. Voy. Ind. Orient., Rept.* p. 297.

— *baska*, *Dum. & Bibr. Erpét. gén.* ii. p. 341.

— *lessonii*, *Dum. & Bibr. Erpét. gén.* ii. p. 338. pl. 16. fig. 1. *Blyth, Journ. As. Soc. Beng.* xxii. 1854, p. 645.

Batagur baska, *Gray*, *Shield Rept.* p. 35. tab. 16, and tab. 36. fig. 1 (skull).

Tetraonyx affinis (part.), *Cantor, Catal. Mal. Rept.* p. 6.

Form.—The most elevated and most convex portion of the shell is in its anterior half whilst the posterior is much depressed and flattened; the greatest width of the shell is behind its middle. The lower parts of the carapace are flat, the sternal portion being narrow. The width of the sternum between the inguinal incisions is rather more than that between the axillary, and two-fifths of its length. Upper shell subtruncated anteriorly.

rounded posteriorly; sternum truncated in front. Small portions between the extremities of the ribs appear to remain cartilaginous during the whole lifetime of the animal.

Plates.—The whole carapace is remarkably smooth and polished. Nuchal plate subquadrangular, much broader than long, and broader posteriorly than anteriorly. The four anterior vertebrals subquadrangular, nearly as broad as long; the fifth hexagonal; none of them have any trace of a ridge. Caudal plates square, separated by a suture, without notch behind; hind margin not serrated, lateral margin sharpish posteriorly and obtuse anteriorly. Gulars twice as broad as long, the length of their suture being two-sevenths of the suture between the postgulars. Postgulars longer than broad, as long as the pectorals, but shorter than the abdominals and preanals. Anals quadrangular, their suture being equal in length to their posterior margins, which meet at a very obtuse angle.

Head covered with undivided skin; snout rather pointed, nose turned upwards; upper jaw denticulated. *Tail* rather shorter than the head.

Feet.—Fingers and toes completely webbed; *four rather weak claws anteriorly and posteriorly*. Forearm and lower leg with very narrow, not imbricate, transverse scutes.

The *colour* is a uniform brown in preserved specimens.

This description is taken from an adult specimen. A young individual, $2\frac{1}{2}$ inches long (*Tetraonyx affinis*, part., Cant.), has the shell orbicular, much depressed, with an obtuse keel along the vertebrals; *it is not serrated* posteriorly, and only the lateral plates project slightly. The skin of the head is rugose. The umbilical cicatrix on the sternum is still visible.

Dr. Cantor says, in his description of *Tetraonyx affinis*, that he had three small specimens for examination; two of them were sent by him to the Collection of the East India Company, whence they have been transferred to the British Museum. They still have the original labels attached to them; but Dr. Cantor was much mistaken in considering them as identical, the one being a young *B. baska*, the other a young individual of a species for which we retain Cantor's name. As it is evident that he himself considered the specimen with four claws, of which, besides, he gives the dimensions, as the type of his *T. affinis*, this name ought to be considered as synonymous with *B. baska*. We have figured the young *B. baska*, from Cantor's collection, on Plate III. figs. B, B', of the natural size.

This fine species, the shell of which attains to a length of 20 inches, is thoroughly aquatic in its habits; it is found in the Ganges and Irawaddy, and probably in numerous other rivers of the Indian continent. Mr. Blyth says that it abounds at the mouth of the Hoogly, and that great numbers are brought to Calcutta, where they are eaten by particular castes of Hindoos, and are even kept for sale in tanks. The specimen from Dr. Cantor's collection appears to have been caught in the sea off Pinang, "with a small hook baited with a shrimp."

BATAGUR LINEATUS. *The Kachuga.**Emys lineata*, Gray, *Syn. Rept.* p. 23.— *kachuga*, Gray, *Illustr. Ind. Zool.* tab.*Batagur lineata*, Gray, *Shield Rept.* p. 35. tab. 17 (young).

Form.—This species resembles somewhat in general form the Batagur, but it is less rounded on the anterior margin of its shell, the nuchal region being rather prominent. Its greatest depth is below the anterior portion of the third vertebral plate, where it is contained twice and three-fifths in the length of the shell; the hinder lateral portions of the upper shell are considerably depressed and dilated. There is a slight notch between the caudal plates; hind margin not serrated. *An interrupted keel along the middle of the vertebrals*, disappearing in old specimens. Sternum flat, with lateral keels in young individuals, subtruncated in front. Small, not ossified portions are still visible between the ends of the ribs in specimens 15 inches long.

Plates.—Nuchal plate broad; the three anterior vertebrals rather broader than long, *the fourth much longer than broad*; all with a low keel, which in the second and third vertebrals terminates in a prominent elongate knob; keel and prominences disappear entirely with age. Caudal plates rather longer than broad. Gulars triangular, not much broader than long, the length of their suture being one-half or two-fifths of that of the suture between the postgulars. *The hind margins of the postgulars meet at an obtuse angle.* Pectorals shorter than abdominals or preanals. Anals quadrangular; the suture between them is much longer than their hind margins, which meet at a very obtuse angle.

Jaws denticulated. *Tail* shorter than the head.

Feet.—Fingers and toes completely webbed; claws feeble, *five anteriorly and four posteriorly.* Forearm and hind part of the lower leg with narrow, not imbricate, transverse scutes.

Colour.—Uniform brown above and yellowish below.

I have had for examination the following specimens:—

1. A shell, 21 inches long, of a very old individual; the epidermis is nearly entirely lost, and the sutures have disappeared. Shell entirely ossaceous. I conclude, from the appearance of the specimen, that it indicates the largest size to which this species grows. It is from Moulmein.

2. A shell, 15 inches long. The vertebral keel has disappeared; narrow strips between the costals and marginals are cartilaginous. It was sent to the British Museum by B. H. Hodgson, Esq., from Nepal.

3. A shell, 10 inches long. Vertebral keel indistinct, prominences obtuse; cartilaginous space half as wide as the third vertebral plate. It was presented to the British Museum by Dr. Falconer, who procured it near "Saharumpoor,"* where the species is said by him to be common.

4. A stuffed specimen, 6½ inches long—the original of the figure given by Dr. Gray in his 'Shield Reptiles.'

* I am unable to find this place in the maps of India: is it another name for Serampoor on the Hoogly?

BATAGUR ELLIOTTI. *Penku Tambel*. (Plate III. figs. A, A'.)

Batagur ellioti, Gray, *Proc. Zool. Soc.* 1862, p. 264.

This species appears to be undescribed; it is founded on young specimens, which, however, are distinguished by characters so well marked that we do not hesitate to introduce it into science under a distinct name, and the more so as we have the means of comparing it with specimens of the allied species of nearly the same age. There is a stuffed specimen, $3\frac{1}{2}$ inches long, in the British Museum, which agrees so well with two drawings made by Walter Elliott, Esq., from living specimens, that it may have been the original of one of them. The stuffed specimen is of unknown origin, whilst the individuals found by Mr. Elliott were obtained on the Kistna River.

Form and Plates.—The shell is rather more elevated than in its congeners, the second and third vertebrals being compressed into a keel terminating in an acute prominence at the end of each plate; the keel is continued along the two posterior vertebral plates, but less prominently. The first vertebral is but little narrower behind than in front; the second and third much broader than long; the fourth hexagonal, as broad as long, united with the third by a long suture; the fifth pentagonal, much broader than the caudals, united with the fourth by a rather short suture. *The posterior margin of the shell is strongly serrated*, and the notch between the caudals is semicircular. Nuchal plate much broader than long.

Sternum narrow, keeled on the sides, the keel terminating in a small spine at the end of each plate. The width of the sternum between the keels is rather less than the width between a sternal keel and the lateral margin of the upper shell. Gulars broader than long; *the hind margins of the postgulars form an obtuse angle*. Postgulars, pectorals, abdominals, and preanals of nearly the same length. The suture between the anals is longer than their hind margins, which meet at an obtuse angle.

Head covered with undivided skin, obliquely truncated in front, with the nose slightly turned upwards; the upper jaw is serrated, and has a slight notch anteriorly. Front part of the fore legs and hinder part of the hind legs with narrow, long, transverse, not imbricate scales. Webs broad; claws rather feeble, but little curved, *five anteriorly and four posteriorly*. Tail shorter than the head.

Colour.—Uniform brownish above, yellowish below. Feet during life dotted with brown.

BATAGUR AFFINIS. (Plate III. figs. C, C'.)

? *Emys trivittata*, Dum. & Bibr. *Erpét. gén.* ii. p. 331.

Emys trivittata, Cantor, *Mal. Rept.* p. 4.

Tetraonyx affinis (part.), Cantor, *l. c.* p. 6.

For the determination of this species I have two examples before me, both from Dr. Cantor's collection: the one is adult, shell 18 inches long, and named *E. trivittata* by Cantor

himself; it is stuffed, and belongs to the East India Collection. The second is quite young, and is one of those examples named by Cantor *Tetraonyx affinis*, a species confounded by him with *Batagur baska*. Both have five claws anteriorly, convex posterior postgular margins, no nuchal plate, and the first vertebral broader than long; they much resemble a species from Borneo (*B. pictus*, Gray, Proc. Zool. Soc. 1862, p. 264), which also has no nuchal plate, but is distinguished by having only four anterior claws.

These two specimens appear to show that the absence of the nuchal plate is of specific value in this case, and therefore it is highly improbable that the *Emys trivittata* of Duméril and Bibron is identical with our species. We therefore prefer to retain the name given by Cantor to the younger specimen, although he has confounded two species under it.

We add, first, some of the characters of the *adult* specimen, the shell of which is 18 inches long by 13 inches broad. It is very convex, with the lower part of the sides very broad; its hind part is not much depressed and scarcely dilated; the serrature of the hind margin, which is visible in the young, has become nearly entirely obsolete; scarcely any trace of a vertebral keel remains. Sternum distinctly rounded, truncated in front. *Nuchal plate none; the first and second vertebrae broader than long*, the fourth not much longer than broad; all the vertebrae smooth, nearly even. Caudal plates longer than broad. Gulars rather broader than long, the suture between them being half as long as that between the postgulars; the hind margins of the postgulars form a slight curve; the abdominals are the longest of the sternal plates. Anals quadrangular; the suture between them is longer than their hind margins. The upper part of the shell is yellowish green, with three broad longitudinal black bands; the lower parts are uniform yellowish; a large black blotch at the anterior angle of the upper side of each marginal plate.

The shell of the *young* specimen is rather soft, flexible, $2\frac{1}{2}$ inches long and $2\frac{3}{4}$ inches broad. It is much depressed, suborbicular, somewhat longer than broad, with an obtuse vertebral ridge not interrupted by prominences, and with an interrupted linear costal ridge; this costal ridge is rather nearer to the vertebral line than to the lateral margin of the shell. Posterior margin of the shell moderately serrated. *Nuchal plate none*; all the vertebrae broader than long, except the last, which is longer than broad, and about twice as broad as the caudals. Sternum narrow, with strong lateral ridges: gulars broader than long; postgulars, pectorals, and abdominals nearly equal in length; the suture between the anals is longer than their hind margins, which meet at an obtuse angle.

Head covered with undivided skin. Jaws not denticulated, the upper with a slight notch anteriorly. Tail shorter than the head. Feet strongly webbed; front part of the fore leg with imbricate, narrow, transverse scutes; claws feeble.

Cantor says that it is not numerous in the rivers and ponds of the Malayan Peninsula and of Pinang; the largest specimen examined was the adult example described above.

The figures of the young are taken from one of Cantor's typical specimens.

BATAGUR DHONGOKA. *The Dhongoka.*

Emys dhongoka, Gray, *Illustr. Ind. Zool.* ii. tab.

— duvaucellii, Dum. & Bibr. *Erpét. gén.* ii. p. 334.

Batagur dhongoka, Gray, *Shield Rept.* p. 36. tab. 18 (young), & tab. 36. fig. 1 (skull).

Although this species is very similar to the *Kachuga*, it may be easily distinguished by several constant characters. The differences between young and old individuals are the same in both species, wherefore we need not repeat them. The *Dhongoka* is rather more depressed in its general form than the *Kachuga*, especially in the hinder third of the shell, which is much dilated. There is a slight notch between the caudal plates; hind margin distinctly serrated in young specimens, the serrature becoming obsolete with age. *An interrupted keel along the middle of the vertebrals.* Sternum flat, with lateral keels in young individuals, truncated in front.

Plates.—Nuchal plate triangular, broadest behind; *the first and second vertebrals longer than broad*; the second as long as broad in young specimens; *the fourth much longer than broad.* All the vertebrals are more or less distinctly keeled, the keel on the second and third vertebrals terminating in a prominent elongate knob. Caudal plates longer than broad. Gulars as broad as long, the suture between them being equal in length to that between the postgulars. *The hind margins of the postgulars form a straight line.* Pectorals shorter than postgulars, abdominals, or præanals. Anals quadrangular; the suture between them is as long as their hind margins, which are concave.

The *soft parts* of this species appear to be very similar to those of the *Kachuga*.

Colour.—*Vertebral ridge and an interrupted stripe on each side of it black.* A yellow line runs from the nostril to the upper part of the tympanum.

This species is found in the Ganges at Sultanpoor (Lahore), in Nepal, and in Assam. The shell of the largest specimen I have seen is 15 inches long and is entirely ossified.

— PLATYSTERNUM, Gray.

Shell entirely bony, comparatively small, much depressed; sterno-costal suture covered with a series of three plates. Head very large, covered with a thick, hard, horny case; jaws strong. Tail very long, covered with rings of subquadrangular shields. Head, tail, and limbs not capable of being retracted within the shell. Toes moderately webbed; claws strong, five anteriorly and four posteriorly.

PLATYSTERNUM MEGACEPHALUM.

Platysternon megacephalum, Gray, *Proc. Zool. Soc.* 1831, p. 106; *Illustr. Ind. Zool. c. tab. Dum.*

Shell much depressed, truncated anteriorly and rounded posteriorly, with the plates arranged in the same way as in the preceding genera. The sternum is rather narrow, flat, joined to the upper shell by three small intercalated plates. The gular plates are very broad and short, their hind margins forming a straight line; pectorals and abdominals shorter than postgulars or præanals; anals large, with an obtuse notch behind.

The carapace is too small to receive the head, legs, or tail within. The head is very large, covered with a hard, horny case, flat and triangular above, broad behind, and compressed at the snout. The jaws are bent anteriorly into a tooth-like hook. Tail very long, as long as the shell, covered with rings of large quadrangular shields.

This very singular tortoise is a native of China, probably of the southern parts, and extends southwards into Pegu, where it has been found by Captain Berdmore at Schwe Gyen, on the Sitang River. Although several specimens were once brought alive to Europe, unfortunately no record of their habits has been preserved. The larger of the two specimens in the British Museum is 14 inches long, the shell measuring 5 inches in length.

Third Family.

THE FRESHWATER TURTLES—TRIONYCIDÆ.

Shell much depressed, covered with soft skin. Feet for swimming; toes distinct, strongly webbed; claws 3—3.

Posterior sternal lobe with a broad flexible flap (valve) on each side . . . *Emyda*, p. 44.
 Sternum without posterior valves; snout conically pointed *Trionyx*, p. 46.
 Sternum without posterior valves; snout short, thick-lipped *Chitra*, p. 50.

EMYDA, Gray.

Shell oval, depressed, only partly ossified, covered with soft skin, a more or less broad margin remaining cartilaginous. Sternum more or less cartilaginous, the ossifications proceeding from seven centres; a broad flexible flap (valve) on each side of the posterior sternal lobe. Feet broadly webbed, with three strong claws anteriorly and posteriorly.

The species of this genus of Freshwater Turtles are so similar to one another, that a general description will suffice to point out their principal characters. From the cartilaginous nature of a portion of the shell and its consequent lightness, these animals are better adapted for a sojourn in water, and the motions of their limbs and neck are much more free than in the preceding genera. The ossifications become more extended over a greater portion of the shell with the advancing growth of the animal, so that only a narrow margin of the upper shell and about one-half of the sternum remain cartilaginous in the full-grown Turtle. The ossified portions assume a coarsely granular surface in drying, and are not covered with epidermal plates: only the sutures between the single vertebræ and ribs are visible. The upper shell is formed by the large, oval, slightly convex vertebro-costal piece, by a broad, small, elliptical nuchal piece, and by a series of marginal bones running along the hinder edge of the shell. There is a pair of sternal ossifications between the fore legs, another (sometimes united) between the hind legs, a third pair round the inguinal incisions, and, finally, a single small ossification behind the front pair. The head and feet can be entirely drawn within the shell, which is capable of some extension; and the flexible front and hind margins, together with the posterior sternal valves, serve to shut up the shell completely.

The neck is very long and flexible; the head short, conical, terminating in a soft, flexible, short tube, with the nasal openings at its extremity. The jaws are covered with sharp horny sheaths, and overlapped by two pairs of broad, soft, pendent lips, the upper and lower lips being interrupted by a broad incision in front. These soft organs of the mouth are evidently the seat of a developed sense, by which these animals are enabled to search for their food, which is hidden in the mud below the surface of the water. The eyes are rather small, slightly directed upwards.

Tail none. Limbs very short, covered with loose, soft skin, in which some crescentic rudiments of scales are imbedded—four or five on the front part of the fore limb, and one on the heel of the hind foot. There are five fingers and toes, united by a very broad web; only three of them are armed with strong claws, the inner of which is a rather powerful weapon, with which the animal can not only inflict severe wounds by scratching, but also easily remove objects under which its food is hidden, or climb over water-plants, &c.

The species of this genus are found in the East Indies, one living in Senegambia; their

habits are thoroughly aquatic and carnivorous; they do not attain to a large size; their eggs are spherical. When the water dries up, they bury themselves deep in the mud.

EMYDA GRANOSA. The Bungoma.

- La Chagrinée, Lacép. Quadr. Ovip.* i. p. 171.
Testudo granosa, Schoepff, Testud. p. 127. tab. 30. A, B.
Emyda punctata, Gray, Syn. Rept. p. 50.
Trionyx punctata, Gray, Illustr. Ind. Zool.
 — *granosus, Gray, Illustr. Ind. Zool.*
 — *coromandelicus, Geoffr. Ann. Mus.* xiv. p. 16. tab. 5. fig. 1.
Cryptopus granosus, Dum. & Bibr. Erpét. gén. ii. p. 501.

The odd osseous plate on the sternum is very small; the plates of the posterior pair rather small, far apart in young specimens, not confluent, and only in very large individuals forming a suture together. Greenish, with large yellowish spots on the head, neck, and shell, which disappear with age.

This species is very abundant on the coast of Coromandel and in Lower Bengal; it has been brought by Messrs. v. Schlagintweit from Allahabad (N.W. Hindostan) and from Sikkim. It grows to a length of 10 inches (shell), and is relished as food by particular castes of Hindoos.

EMYDA CEYLONENSIS.

- Emyda punctata, Kelaart, Prodr. Faun. Ceyl.* p. 179. *Bell, Testud. c.* tab. duab.
 — *ceylonensis, Gray, Shield Rept.* p. 64. tab. 29. A.

Scarcely specifically distinct from *E. granosa*; the odd osseous plate on the sternum is larger; the plates of the posterior pair of moderate size, confluent in the adult, and rather close together in young specimens. Olive-green, with indistinct brown stripes, and minutely punctated; beneath white or fleshy white. Head green, black-striped; lips yellow.

The specimens on which this species has been founded are from Ceylon. The shell of the largest specimen examined by the late Dr. Kelaart measured $13\frac{1}{2}$ inches. The same author remarks:—

"This Water Tortoise is generally distributed in the lower parts of the island, found in lakes and tanks. Several we kept alive for months in a tub filled with fresh water fed freely on animal food, and also on bread and boiled rice. A large female laid three eggs, globular, about 1 inch in diameter, with a hard calcareous shell. This tortoise, too (like *Emys trijuga*), is put into wells to act the part of a scavenger. The shell is in fresh specimens smooth, and it is only in drying that the granular surface of the bony shell is apparent."

EMYDA VITTATA.

Emyda vittata, Peters, *Monatsber. Berl. Acad.* 1854, p. 216.

This species has been characterized by the black streaks and spots on the head and neck, and is said to have been brought from Goa.

TRIONYX, Geoffr.

Shell much depressed, only partly ossified, covered with soft skin, dilated into a broad cartilaginous margin posteriorly. Sternum more or less cartilaginous, sometimes with two pairs of externally visible osseous plates, and with the hinder lobe not dilated into lateral valves. Feet broadly webbed, with three strong claws anteriorly and posteriorly. Muzzle produced into a nasal tube; snout conically pointed.

This genus is so closely allied to *Emyda* in its structure and in its habits, that we may refer to the general description given above. The different species also are extremely similar to one another. *Trionyx*, however, wants that series of bones which is found in the posterior dilated margin of the upper shell of *Emyda*; and instead of seven externally visible ossifications in the sternum, it has only four, viz. the inguinal and the anal pair. The hinder sternal lobe is small, without lateral valves. The head is more elongate than in *Emyda*, and the tail, although short, always distinct; it is longer in males than in females.

The species of this genus are found in North America, Africa, and the East Indies; they are the largest of the Freshwater Turtles, and thoroughly aquatic and carnivorous.

Various methods of distinguishing the different species must be resorted to: one character is the colours, more distinct during life and in young individuals, but changing with age; another character is the arrangement of small tubercles on the skin of the upper shell, visible only in (young) specimens, fresh or preserved in spirits; finally, a third and very important character is the structure and shape of the ossified plates, which can be examined only in dried, more or less full-grown individuals.

TRIONYX SINENSIS.

Trionyx sinensis, Wiegman, *Nov. Act. Acad. Leop. Carol.* xvii. 1835, p. 189. *Strauch, Cheloneology. Stud.* p. 177.

— *tuberculatus*, Cantor, *Ann. & Mag. Nat. Hist.* ix. 1842, p. 482.

Tyrse perocclata, Gray, *Catal. Tort. Brit. Mus.* p. 48.

Trionyx perocclatus, Gray, *Catal. Shield Rept.* p. 65. tab. 31.

Shell of the adult.—The bony carapace rather longer than broad, with a low but very distinct vertebral ridge. The anterior dorsal bone short, broad, rugose like the other costal

plates, and confluent with the first pair of costals. The surface of the bony carapace is finely rugose, without tubercles. The hinder sternal plates ovate, converging behind, rather larger than the last costal plates.

Young specimens (in spirits) are distinguished by having the small tubercles of the epidermis arranged in about ten irregular longitudinal series on each side of the upper shell, the series being rather remote from one another. Upper side with scattered, rounded, brownish, light-edged spots; these spots disappear with age. The whole head and the throat with small brown spots, and with a brown line from the lip, through the eye, along each side of the occiput; another brown transverse line between the eyes, and sometimes a third below the eye. Young specimens have sometimes large symmetrical blackish spots on the sternum and at the root of the tail.

This species is peculiar to China; it has been found also on the Chinese island of Chusan, and is common in Formosa, where it has been collected by Mr. Swinhoe. The shell of the largest specimen in the British Museum is 7 inches long.

TRIONYX GANGETICUS.

Trionyx gangeticus, Cuv. *Règne Anim.*

— *harum*, Gray, *Illustr. Ind. Zool. c. tab.*

— *ocellatus*, Gray, *Illustr. Ind. Zool. c. tab.*

Gymnopus duvaucellii, Dum. & Bibr. *Erpét. gén. ii. p. 487.*

— *ocellatus*, Dum. & Bibr. *l. c. p. 489. Jacquem. Voy. Ind., Rept. pl. 9.*

— *gangeticus*, Cantor, *Mal. Rept. p. 8.*

Shell of the adult.—The bony carapace rather longer than broad, with a slight swelling anteriorly on the vertebral line. The anterior dorsal bone rather short, broad, rugose like the other costal plates, and confluent with the first pair of costals. The surface of the bony carapace is coarsely rugose, without prominent tubercles.

Young specimens (in spirits) with a low, rather indistinct vertebral ridge, terminating in a slight transverse swelling anteriorly. The small tubercles of the epidermis are arranged in twelve or thirteen very irregular interrupted lines on each side of the upper shell. All the sternal bones are covered with soft skin. Greyish olive, with two or three pairs of deep-brown ocelli, each of which has a black, red-edged centre; the soft parts and the margin of the shell with yellowish dots; a rounded yellowish spot behind each eye, another across the nose, and one on the angle of the mouth. Traces only of these ocelli appear to remain in older individuals, and at length disappear entirely.

This species is found in the Ganges and its tributaries, upwards to Nepal; and at Pinang, in rivers and on the sea-coast. Dr. Cantor says that it is of fierce habits, defending itself desperately by biting, and emitting when excited a low, hoarse, cackling sound. It appears to be far less numerous at Pinang than *T. javanicus* and *Chitra indica*. The shell of the largest specimen observed was 23 inches long.

TRIONYX JAVANICUS.

Trionyx javanicus, Schweigg. *Prodr.* p. 287. Gray, *Illustr. Ind. Zool.* c. tab.

Gymnopus javanicus, Dum. & Bibr. *Erpét. gén.* ii. p. 493.

— *cartilaginea*, (Boddaert) Cantor, *Catal. Rept.* p. 9.

Shell of dried adult specimens.—The bony carapace is rather longer than broad, with the vertebral line slightly elevated. The anterior dorsal bone is rugose and confluent with the anterior costals; in young specimens only a part of its surface is rugose. Surface of the carapace very coarsely rugose, some irregular longitudinal lines being more prominent than the rest. Middle and hinder sternal bones nearly entirely rugose.

Young specimens (in spirits) with a low, rather indistinct vertebral ridge; the small tubercles of the epidermis are arranged in thirteen or fourteen irregular interrupted longitudinal lines. All the sternal bones covered with soft skin. Three pairs of violet stripes diverge from a median stripe running from between the eyes to the nape. Upper shell sometimes with brown, red-edged ocelli, more or less regularly disposed in pairs.

This species is found in the Ganges and its tributaries, in the Deccan, and, according to Cantor, at Pinang, where it would appear to be numerous. However, two specimens from Dr. Cantor's collection, named by him *Trionyx javanicus*, do not belong to this species, but to *Tr. subplanus*.

Tr. javanicus has been founded on specimens from Java, which I have not had an opportunity of examining. The characteristic markings of the head of the continental specimens are not mentioned in descriptions of Javan individuals, so that both may be specifically different.

TRIONYX ORNATUS. (Plate VI. fig. B.)

Trionyx ornatus, Gray, *Proc. Zool. Soc.* 1861, p. 41. pl. 5 (young).

Shell of the adult.—The bony carapace is longer than broad, with the vertebral line slightly elevated. The anterior dorsal bone is not rugose on its surface; there is a non-ossified space behind it. Surface of the carapace very coarsely rugose, some of the reticulated lines being more prominent than the rest; only the middle sternal bones have a small portion rugose, the remainder being covered with skin. Head and feet with numerous yellowish dots.

Young specimen.—The small tubercles of the skin are very irregularly arranged, forming close, interrupted series. Shell brownish, with large, round, irregularly disposed, black, yellow-edged spots; the upper side of the head with black dots; the lateral and lower parts of the neck with large yellow spots; limbs with smaller spots of the same colour.

The British Museum possesses three specimens of this very distinct species: one from

Siam, shell 7 inches long; one from Gamboja, which is young, and has been figured by Dr. Gray; the third specimen, shell 9 inches long, is from Sarawak (Borneo): the first of them is figured on Plate VI.

TRIONYX SUBPLANUS.

Trionyx subplanus, Schlegel, *Arch. Königsb.* i. p. 289. Gray, *Illustr. Ind. Zool.* c. tab.

Gymnopus subplanus, Dum. & Bibr. *Erpét. gén.* ii. p. 496.

Trionyx frenatus, Gray, *Shield Rept.* p. 67.

Dogania subplana, Gray, *Shield Rept.* p. 69. tab. 33 (from a Japanese specimen).

Shell of the adult.—The bony carapace is longer than broad, much depressed along the vertebral line. The anterior dorsal bone is not rugose on its surface, or but little in its centre; there is a large space not ossified between it and between the first costal. The second costal is two-fifths as broad as long; the last costal narrow. The surface of the bony carapace is finely rugose, without tubercles. Sternal plates covered with skin, and only a very small portion has the surface slightly rugose.

Young specimen (in spirits).—The small tubercles on the epidermis form about seventeen longitudinal series, which are close together. Brownish, marbled with yellowish and brown; head and neck with yellowish dots; faint traces of an oblique dark streak behind each eye are visible in some specimens.

This species is found at Singapore, at Pinang, and in Japan. The shell of the largest specimen in the British Museum is 10 inches long. A female individual, from Singapore, with a shell only 6 inches long, had several eggs in the oviduct when captured.

TRIONYX GÜNTHERI. (Plate VI. fig. A.)

Dogania güntheri, Gray, *Proc. Zool. Soc.* 1862, p. 265.

The bony carapace is as broad as long, and much depressed, especially along the vertebral line. The anterior dorsal bone is finely rugose in its whole extent, like the remainder of the shell, leaving a broad, ovate cartilaginous space behind. The second costal is nearly three times as long as broad; the last costal narrow, not much shorter than the penultimate. A large portion of the middle and hinder sternal bones is rugose.

There is only one dried specimen in the British Museum, which formerly formed part of the East India Company's Collection. The shell is 7 inches long, head and neck 5 inches.

CHITRA, *Gray.*

This genus is very closely allied to *Trionyx*, from which it differs only in the form of the head; the hind part of the head is more elongate, whilst the snout is short, with very thick lips and with a short, prominent nasal tube.

It is founded on the following species, which does not appear to differ in its habits from the true *Trionyx*.

CHITRA INDICA. (Plate VI. fig. C.)

Trionyx indicus, *Gray, Syn. Rept.* p. 47.

— *egyptiacus*, var. *indicus*, *Gray, Illustr. Ind. Zool. c. tab.*

Gymnopus lineatus, *Dum. & Bibr. Erpét. gén. ii. p. 491.*

— *indicus*, *Cantor, Mal. Rept.* p. 10.

Chitra indica, *Gray, Shield Rept.* p. 70.

Shell of the adult.—The bony carapace is as long as broad, and much flattened. The anterior dorsal bone large, broad, rugose, confluent with the first costals. The middle and hinder sternal plates with very large rugose patches.

There is only one rudimentary scale or, rather, fold of the skin on the front part of the fore limb.

The shell is greenish olive above, vermiculated and spotted with brown or rust-colour.

This species grows to a very large size, and, like the *Trionyx*, it is eaten by the natives, particularly the Chinese. It is found in the Ganges and in its tributaries, upwards into Nepal; it is frequent in the estuaries of the Malayan Peninsula, and Mr. Cuming has brought home some fine examples, said to have been procured in the Philippine Islands. Specimens are found weighing 240 pounds; they are very powerful and of ferocious habits. The shell of the largest individual observed by Dr. Cantor measured 37 inches*; that figured by us in Plate VI. is a mature specimen, of half its natural size.

* Jerdon (*Journ. As. Soc. Beng.* xxii. 1854, p. 464) says that he procured a specimen in a net at Mahé, on the Malabar coast, where it is considered rare. It is doubtful whether Mr. Jerdon has properly determined that specimen.

Fourth Family.

MARINE TURTLES—*CHELONIDÆ*.

The Marine Turtles are at once distinguished by their long, compressed, fin-shaped, non-retractile feet, the toes being enclosed in a common skin, out of which only one or two claws project. The carapace is broad and much depressed, so that when these animals are on shore and are turned over on their back, they cannot regain their natural position. Large interspaces between the extremities of the ribs and portions of the sternum are never ossified, but always remain cartilaginous, so that the carapace in these Turtles is specifically lighter than that of the preceding families. The head is large and globose, and cannot be retracted within the shell; it is covered above with symmetrical horny shields, and the jaws are armed with sharp horny sheaths. They are thoroughly marine animals; their pinnate feet and their light shell render them the best swimmers in the class of Reptiles; they sometimes live hundreds of miles distant from shore, to which they periodically return, in order to deposit from 100 to 250 soft-shelled eggs, which are buried in the sand. The food of some species consists exclusively of algæ; others subsist upon fish and mollusca. They are found in all the intertropical seas; sometimes they travel far into the temperate regions. The flesh and eggs of all the species are edible, although the Indian Turtles are much less appreciated in this respect than those of the Atlantic. At certain seasons the flesh of *Chelonia virgata* acquires poisonous qualities, and lamentable instances of death have been ascribed to its use*.

The Indian Turtles belong to the following genera:—

Vertebral and costal shields 15	<i>Caouana</i> , p. 51.
Vertebral and costal shields 13, not imbricate	<i>Chelonia</i> , p. 52.
Vertebral and costal shields 13, imbricate	<i>Caretta</i> , p. 53.
The whole animal, with the carapace, is covered with a coriaceous skin	<i>Dermatochelys</i> , p. 55.

CAOUANA, Gray.

Fifteen vertebral and costal shields, which are thin and not imbricate. A ridge or a series of prominent knobs along the rows of vertebral and costal shields in young animals.

Carnivorous, eating fishes, mollusca, and crustacea. The genus comprises an Atlantic species, the Loggerhead, which does not appear to extend into the Indian Ocean, and the following, which, on the other hand, is confined to the East Indies.

* Sir J. E. Tennent, Nat. Hist. Ceylon, p. 292. The case there mentioned happened in the month of October.

CAOUANA OLIVACEA. The Indian Loggerhead.

Chelonia olivacea, *Eschscholtz, Zool. Atl. tab. 3. Cantor, Catal. Mal. Rept. p. 13.*

— *dussumieri, Dum. & Bibr. Expt. gén. ii. p. 557.*

Caouana olivacea, *Gray, Catal. Shield Rept. p. 73.*

The principal character by which this species is distinguished from its Atlantic congener is the presence of only a single small claw to each of its feet. It never has less than fifteen vertebral and costal shields, but frequently one or several of these are again divided into two, so that their number may be raised to nineteen or twenty. In old specimens (20 to 24 inches long) the shell is perfectly smooth, whilst in young ones each of the shields mentioned is provided with a more or less prominent ridge or oblong knob. The fore limbs are very long, extending backwards to the hind limbs.

This species has been found in the Bay of Bengal, on the coasts of Malabar and Pinang, and in the seas of the Philippine Islands and of China. Cantor calls a specimen the shell of which is 25 inches long, not quite full-grown. He says that at Pinang it is of rare occurrence, and that its flesh, though relished by the Chinese settlers, is unpalatable to Europeans. According to Blyth it is abundant at the mouth of the Hoogly. Specimens are rarely brought to Europe.

CHELONIA.

Chelonia, (*Flem.*) *Gray, Shield Rept. p. 74.*

Thirteen vertebral and costal shields, which are thin and not imbricate.
Shell of young animals without or with feeble longitudinal ridges.

Herbivorous, feeding on algae.

The species of this genus extend over nearly all the seas between the tropics; but whether they belong to two or more species is a question which cannot be decided in the present state of our knowledge. This difficulty arises chiefly from two circumstances: first, from the great changes to which the form of the carapace and of the single shields is subject during the different periods of life in animals which attain to so large a size as the Turtles. Secondly, it is probable that the Atlantic species is different from the Indian, and from that of the Pacific; again, each of these regions may be inhabited by more than one species, or one species may be common to two or three oceans: but, in order to decide this question, it would be necessary to have a series of examples *with their native places well ascertained*; unfortunately such a series does not exist in any European collection, and thus we are still unable to distinguish clearly those species which are the most important of all the reptiles on account of their value to man.

The names of *Chelonia midas* and *Chelonia viridis* have been given chiefly to specimens from the Atlantic, although Indian examples also were frequently comprised under the same

denominations. Both names are now considered to indicate the same species, and one of them ought to be retained for that species which is the most common in the Atlantic, and in our collections. The name of *Chelonia virgata* has been given to specimens from the Red Sea, which may be considered as identical with others from the Indian Ocean. Duméril and Bibron, however, apply it to Atlantic specimens as well as to Indian ones.

Finally, Cuvier and Duméril and Bibron distinguish two other species besides, namely *Ch. maculosa* and *Ch. marmorata*, the former from the coast of Malabar, and the latter from the Atlantic. Gray and Agassiz consider both of them as identical, and the former author as even synonymous to *Ch. virgata*.

The differences of the species named consist chiefly in modifications of the colours and in the form of the shields, characters the constancy of which I have failed to recognize in the specimens that I have examined. Two young specimens from Singapore (from Dr. Cantor's collection) have been carefully compared with individuals of the same size from the Island of Ascension, and although they differ from some of the latter in several points, there are others which are perfectly intermediate. Only the central shield on the crown of the head appeared to be a little larger in the Indian specimens than in those from Ascension.

Agassiz, in his Natural History of the United States, has experienced the same difficulties, and has retained, for the present, the name of *Ch. midas* for the Atlantic individuals, and that of *Ch. virgata* for those from the Pacific.

Chelonia virgata, as we will call the Indian Turtle, appears to be found on all the coasts of the East Indies*. Cantor says that "it is at all seasons plentifully taken in fishing-stakes in the Straits of Malacca; it is the 'Green Turtle' of the European inhabitants of our settlements and of the seaports of India. In size it equals the Atlantic Turtle, which it rivals in flavour. About December and January is the season when the female deposits her eggs, in the sandy beach of some sequestered island, and then the fishermen watch during the moonlight nights to 'turn turtles.' The eggs are of a spherical shape, about 1 inch in diameter, covered by a soft semitransparent membrane of a pale-yellow colour. The expert eye of the fisherman baffles the pains with which the turtle conceals her eggs, and prodigious numbers are disinterred. They are very rich-flavoured, like marrow, and will keep for weeks although exposed to the air."

We have already mentioned that the flesh of this species is sometimes found to be poisonous.

CARETTA.

Caretta, (Merr.) Gray, *Shield Rept.* p. 73.

Thirteen vertebral and costal shields, which are produced behind and imbricate. Two claws to each foot. Shell of young animals with three keels.—Carnivorous.

* We have received one specimen from the Island of Formosa, through Mr. Swinhoe.

*CARETTA SQUAMATA. The Hawk-bill Turtle or Indian Caret.**Caretta imbricata* (part.), *aucl.**Testudo squamata*, *Bont. Jav.* p. 82.*Eretmochelys squamata*, *Agass. Nat. Hist. U. States*, i. p. 382.

Linnaeus, in his 'Systema Naturæ,' enumerates the species of Turtle famous by the tortoise-shell which it supplies to commerce, as *Testudo imbricata*, referring to it specimens from the Atlantic as well as from the Indian Ocean, and quoting the Javan *Testudo squamata* of Bontius as a synonym. All subsequent zoologists have adopted Linnaeus's view, until the Indian Caret was separated from the Atlantic form by L. Agassiz (*Nat. Hist. United States*, i. p. 382), under the name of *Eretmochelys squamata*. Whether this distinction will hold good I am not prepared to say, as I have not had an opportunity of examining specimens from the Atlantic; and I must not omit to remark, that of the characters assigned by Agassiz to the Indian Caret, only the presence of very small scales on the neck appears to be constant, whilst the ridges on the epidermal shields are by no means equally developed in all the specimens, but frequently low and incomplete, as is stated to be the case in the Atlantic *Caretta imbricata*. The following would be the characters of the Indian species:—

Very small horny scales are imbedded in the skin of the neck; the median keel extends generally over all the vertebral shields; other ridges diverge from the point of each vertebral shield. The costal shields also have sometimes prominent ridges, commencing at the angles they form with the marginal plates and running to the point of each costal.

The Hawk-bill Turtle, so named from its rather elongate and compressed, curved upper jaw, does not attain to the same size as the other Turtles: a shell 2 feet long is considered as extraordinarily large. Although it is found throughout the East Indian Archipelago, it is plentiful only at certain localities—for instance, on parts of the coasts of Ceylon (Hambantotte, Matura), of the Maldives, of Celebes, &c. As, however, Turtles always resort to the locality where they were born, or where they have been used to propagate their kind, and as their capture is very profitable, they become scarcer and scarcer at places where they are known to have been abundant formerly. Kelaart (*Rept. Ceyl.* p. 181) says that some specimens sell for as much as £4, the price depending on the quality of the shell. If taken from the animal when decomposition has set in, the colour of the shell becomes clouded and milky, and hence the cruel expedient is resorted to of suspending the turtle over fire till heat makes the shields start from the bony part of the carapace, after which the creature is permitted to escape to the water*. There is no doubt that Turtles thus allowed to escape to the water after such an operation may live; but there can be no repetition of this torture, as a reproduction of the epidermal shields to such a great extent is improbable. At Celebes, whence the finest tortoiseshell is exported to China, the natives kill the turtle by blows on the head, and immerse the shell in boiling water to detach the plates: dry heat is only resorted to by the unskilful†. The natives eat the flesh of this turtle, but it is unpalatable to Europeans; the eggs, however, are regarded as equal to those of the other Turtles. The British Museum possesses a fine example, brought by Mr. Swinhoe from Formosa.

* Sir E. J. Tennent's *Nat. Hist. Ceylon*, p. 293.† *Journ. Ind. Archip.* iii. 1849, p. 227.

DERMATOCHELYS, *Blainv.*

Carapace subcordiform, covered with a coriaceous skin like the remainder of the animal.—Herbivorous.

DERMATOCHELYS CORIACEA.

Testudo coriacea, *L. Syst. Nat.* i. p. 350.

Sphargia mercurialis, *Merr. Tent.* p. 19. *Schleg. Faun. Japon., Rept.* p. 6. tab. 1.

— *coriacea*, *Gray, Syn. Rept.* p. 51. *Dum. & Bibr. Erpét. gén.* ii. p. 560. pl. 24. fig. 2. *Tickell, Journ. As. Soc. Beng.* 1862, p. 367, c. fig.

Shell above with seven longitudinal ridges, separated from one another by grooves. Skin smooth in adult specimens, tubercular in young ones.

This Turtle, although scarce, appears to be spread throughout almost all the seas of the tropical and temperate regions, having been found in the Mediterranean, on the south coast of England, in the West Indies, at the Cape of Good Hope, on the coasts of the United States, in Chili, and in Japan. Its occurrence lately in India has been recorded by Major S. R. Tickell, who gives a very interesting account of the capture of a female specimen on the coast of Tenasserim, from which we extract the following notes:—

"She was captured February 1st, 1862, near the mouth of the Yé River, on the sandy beach of which she had deposited about a hundred eggs, when she was surprised by a number of Burmese fishermen who had been lying in ambush near the spot (a favourite resort of the common Turtle, *Chelonia virgata*), and after a desperate struggle was secured. Her entire length was 6 feet 2½ inches.

"The strength, aided of course by the enormous weight, of the animal was such, that she dragged six men, endeavouring to stop her, down the slope of the beach, almost into the sea, when she was overpowered by increased numbers, lashed to some strong poles, and brought into the village by ten to twelve men at a time.

"The specimen under review was sufficiently aged to have lost all traces of plates or shields on the head, which was tolerably smooth, and apparently covered with a plain, tight, coriaceous skin, loosened into folds and wrinkles on the throat and neck—like that on the trunk of an elephant. The paddles were covered with similar hard, stretched leather. The fore paddles had, on the extremities of the middle and little fingers, a triangular flat nail, the spaces answering to the ends of the index and ring fingers being marked with a curvilinear sharpish edge of the skin. On the hind paddle, the innermost or little toe will be found strongly relieved from the contour of the rest of the foot, and covered by a broad triangular scale or nail.

"The eggs were spherical, of 1¼" diameter, and are as palatable as those of the river Tortoise are nauseous. Besides those the animal had laid in the sand, there must have been upwards of a thousand in her ovaria, in all stages of maturity. The flesh was dark and coarse, and very few of the crowds of Burmans assembled at Yé to see the animal would eat any of it.

"It is of exceedingly rare occurrence. The few that have been seen were on the shores of the numerous islands along the coast. This was the first one ever found on the mainland."

THE ORDER OF LIZARDS—*SAURIA*.

Anterior ribs generally joined to a sternum. Tail more or less long. Jaws toothed; the mandibles united in front by an osseous suture. Limbs generally four, sometimes rudimentary or not visible externally. Eyelids generally present. Integuments with scale-like folds or osseous scutes, or granular.

By far the greater portion of the Saurians are easily distinguished from the other orders of Reptiles by their elongate form, by their moveable thorax covered with skin, by the presence of legs, and by their general integuments, which are either folded into scales, or granular, or tubercular, or shielded. Still, there are many Saurians which, at a superficial glance, might easily be taken for members of the next order—that of the Snakes, and it cannot be denied that there is a gradual transition between both these orders. On the part of the Saurians, we allude to those which have no externally visible legs, and which combine with a greatly elongate, cylindrical body, the peculiar kind of locomotion we observe in Snakes. Yet the greater affinity of these reptiles to the Lizards is indicated by another character which is in intimate connexion with their mode of life:—The Snakes, having moveable maxillary bones, and mandibles not joined by a symphysis, are enabled to swallow other animals of an apparently greater bulk than their own. In the Saurians the maxillæ are fixed and immoveable, and the mandibles are joined by an osseous suture, so that the cleft of the mouth can be dilated only in a vertical direction, and not horizontally. Moreover, in these limbless Saurians we always find bones of the shoulder hidden below the skin, whilst no trace of them can be discovered in the true Snakes. The motions of some Lizards are extremely slow, while those of others are executed with very great, but not lasting, rapidity.

Many Lizards have the power of changing their colours; this depends on the presence of several layers of cells loaded with different pigments; the animal spreads or compresses these layers by more or less inflating its lungs, whereby the changes in the coloration are effected.

The tongue is differently shaped and has different functions in this order of Reptiles, affording an excellent character for their subdivision.

1. It is extremely short, flat, immoveable, and attached to the bottom of the mouth, without special function (*Crocodyles*).

2. It is slender, exsertile, and forked in front (*Leptoglossæ*, *Fissilingues*): a tongue of this shape is eminently adapted for touching; it is also used for cleansing the lips after the animal has fed.

3. It is short, thick, soft, attached to the gullet, and not, or but slightly, notched in front (*Pachyglossæ*, *Crassilingues*): many Lizards with such a tongue are herbivorous; and we cannot doubt that it is an organ of taste.

4. It is extremely long, worm-like, club-shaped in front, projectile (*Vermilingues*, Chameleons): it serves for seizing the prey, and reminds us of the tongue in many *Edentata*, in the *Picidae*, and in many tailless Batrachians.

The atlas is joined to the occiput by one condyle only; the vertebræ are concave in front and convex behind, with the exception of the *Hatteria*, from New Zealand. The species with well-developed limbs have a sternum and a *symphysis ossium ischii*, beside that of the pubic bones.

The Saurians are oviparous: a few ovoviviparous.

They have been divided into many families; representatives of the following occur in British India:—

I. EMYDOSAURI.

Body cuirassed with osseous plates; vent longitudinal.

Tongue short, flat, immoveable CROCODYLIDÆ, p. 58.

II. LACERTINI.

Body covered with a skin folded into scales, or granular, or tubercular; vent transverse.

A. LEPTOGLOSSA. Tongue elongate, exsertile, forked.

Head covered above with numerous small, flat, many-sided shields VARANIDÆ, p. 63.

Head covered above with large symmetrical shields; no longitudinal fold along the sides; scales of the belly square, in transverse bands LACERTIDÆ, p. 68.

Head covered above with regular, symmetrical, many-sided shields; a fold along the side of the body; scales of the belly square or roundish, in cross bands ZONURIDÆ, p. 74.

Head covered above with symmetrical, regular shields; scales of the back, sides, and belly rounded, imbricate, quincuncial. Nostril in a separate nasal plate SCINCIDÆ, p. 75.

Head covered above with symmetrical, regular shields; scales of the back, sides, and belly rounded, imbricate, quincuncial. Nostril in the enlarged rostral plate, with a longitudinal slit behind ACONTIADIDÆ, p. 96.

Head covered above with symmetrical, regular shields; scales of the back, sides, and belly rounded, imbricate, quincuncial. Nostril in the front edge of a small shield, in a notch at the hinder side of the rostral SEPIIDÆ, p. 98.

B. PACHYGLOSSA. Tongue short, thick, attached to the gullet, not exsertile.

Scales of the back and sides granular or tubercular GECKOTIDÆ, p. 99.

Scales of the back and sides imbricate, generally rhombic AGAMIDÆ, p. 120.

C. VERMILINGUES. Tongue worm-like, club-shaped in front, very exsertile.

Scales of the body granular CHAMELEONIDÆ, p. 162.

FAMILY OF CROCODILES—*CROCODILIDÆ*.

Head with the snout produced; body depressed, covered above and below with square shields arranged in longitudinal and transverse series; each dorsal shield is composed of an osseous dermal scute and of a corresponding horny epidermal plate. Tail elongate, compressed. Feet short, more or less webbed. Teeth strong, acute, conical, in a single series. Tongue short, adherent. Nostrils small, situated close together, on the top of the extremity of the snout. Toes 5—4; only the three interior are armed with claws.

Freshwater Saurians, found between the tropics wherever the country is watered by sufficiently large rivers or lakes.

The Crocodilians differ in many essential points from all the other Saurians. The pectoral and abdominal cavities are separated from each other by a muscular diaphragm: the ventricular portion of the heart is divided by a complete septum, so that the oxygenated blood coming from the lungs is not mixed within the heart with the venous blood; but a slight intermingling of both kinds of blood takes place in consequence of a persistent communication between the two aortæ. The teeth are implanted in sockets, whilst in all the other Saurians they are ankylosed to the bone. The penis is simple. These and some other peculiarities have induced many zoologists to consider the Crocodilians either as a distinct suborder of the Saurians (*Loricati*), or to separate them altogether as an order intermediate between the Tortoises and Lizards (*Emydosauri*).

The most conspicuous characters of the Crocodiles refer to their thoroughly aquatic life; but these characters are combined with an extremely powerful development of those organs which render the Crocodiles the most formidable of all the carnivorous freshwater animals. The head, terminating in a long flat snout and fastened to the trunk by a short muscular neck, and the longish, depressed trunk, are rapidly propelled through the water by powerful lateral movements of the long, compressed tail. The surface of the tail is enlarged superiorly by a crest, which is composed of a double series of broad lobes in its basal half, and of a single one along its remainder; these lobes are a sort of caudal web, answering the same purpose as the lobes of the feet of some Grallatorial birds. The limbs themselves are short, and of secondary use for locomotion in the water, and being more or less webbed in the different species, they appear to be mainly for the purpose of preventing these heavy animals from sinking in the soft mud or sand, when they are walking on the shore. The tail is not only the principal organ for locomotion, but, at the same time, a powerful weapon; and, in a captured animal, much less is to be feared from its teeth than from the strokes of its tail.

The back, the tail, and the belly are protected by a dermal armour composed of quadrangular shields, which are arranged in regular longitudinal and transverse series. These

shields are horny plates; but, on the back (and, in several American Alligators, on the belly), these plates are merely coverings of hard bony scutes imbedded in the skin, and of the same form and number as the plates. This armour not only most effectually protects the body—a rifle-ball glancing off from it as from a rock—but it also serves as ballast, by the aid of which a Crocodile sleeping on the surface of the water is enabled to sink to the bottom instantaneously on being disturbed, driving out the air from its capacious lungs by which it had been kept floating.

A considerable proportion of the food of the Crocodile is fish, the proverbial swiftness of which is of little avail when pursued by these reptiles; they fall an easy prey especially to the young animals, these being more active than the old ones. The latter, requiring a greater quantity of food, attack every large animal which accidentally approaches them, and, in overpowering it, the whole of their powerful organization is called into requisition. Seizing the victim between their capacious jaws, and fastening their long, pointed, conical teeth into its flesh, they draw it, in one moment, by their weight and with a stroke of the tail, below the water and drown it. Their gullet, however, is much too narrow to allow of the passage of the entire body of the victim; and their teeth being adapted for seizing and holding fast only, and not for biting, they are obliged to mangle the carcase, tearing off single pieces by sudden strong jerks. This is performed chiefly by lateral motions of the head and front part of the body; and we find the bones of the head of the Crocodile much more firmly united with one another, and the processes of the cervical vertebrae much more developed, than in any other Saurian.

The nostrils are narrow, situated close together at the upper side of the extremity of the snout; the eyes and the ears likewise are near to the upper profile of the head, so that breathing, seeing, and hearing are uninterrupted although the whole animal is immersed in the water, only the upper part of the head being raised above the surface. When the animal dives, the nostrils are closed by valves, a transparent membrane (*membrana nictitans*) is drawn over the eye, and the ear (a horizontal slit) is shut up by a moveable projecting flap of the skin.

When we add that the pupil of some species is horizontal and of others vertical (indicating their nocturnal or seminocturnal habits), that the tongue is short, flat, immoveable, attached to the bottom of the mouth, and that the vent is a longitudinal slit, and not a transverse opening as in other Saurians, we shall have enumerated all the important external peculiarities of the Crocodiles.

The Indian Crocodiles inhabit not only rivers and estuaries, but, according to Cantor, also the sea-coasts, and in calm weather may be seen floating at a distance of two or three miles from shore. Those inhabiting small inland waters which are dried up during a drought are compelled to wander about in search of water, in which alone they can procure their food; they do this during the night. Some of them, however, especially large individuals, bury themselves in the mud, as many freshwater tortoises and fish do, and remain in a state of torpor below the hard crust during the time of the drought. It is during that period, shortly after they have been released from the state of an enforced fasting, that they are most formidable. Whilst at other periods they quietly wait till some victim is brought by accident within easy reach, hunger now renders them more audacious and compels them to go in search of food; a noise which at other times would scare them away, now attracts

them, and only too frequently man is the unfortunate object attacked. A man seized by a crocodile has only one way of saving his life, if not his limb, namely to force his fingers into the eyes of the beast, which immediately lets go its victim,—a practice equally known to the Indian of South America, to the Negro of Africa, and to the Hindoo. Dr. Cantor says that a single crocodile will often appropriate to himself a limited district, which, if it happens to be in the vicinity of a village, will soon be perceived in the loss of the grazing cattle. It does not appear to be very difficult to catch such a single depredator by a hook baited with flesh or entrails, and made fast by a bunch of strong, thin cords, which it cannot gnaw asunder, as they sink into the spaces between the teeth*. When drawn on shore they emit a strong musk-like smell, out of some glands, two of which are situated in the lower jaw; they make a noise intermediate between hissing and bellowing, clashing the jaws together. It is not easy to kill them on the spot, except by a ball sent through the eye into the brain, or through the neck to the spinal cord: of course, a severe injury to any of the vital parts will prove fatal to them, but not before days or weeks have elapsed.

All the Crocodiles are oviparous: the eggs have a hard shell, and resemble in size and shape those of a goose; from twenty to sixty are deposited in a hollow near the banks, and slightly covered over with mould or sand. The young Crocodiles are of a rather rapid growth. Jerdon has recorded one case† in which an egg of *Crocodylus porosus*, brought from the fort ditch at Vellore to Walter Elliott, Esq., was hatched in the Government-house compound, and in eight years had increased to the length of 8 or 9 feet, becoming so powerful as to destroy a full-grown buck antelope which had come to drink water at the tank to which it usually resorted.

The following genera are found in British India‡:—

Snout moderately long; teeth $\frac{18 \text{ or } 19}{15}$ *Crocodylus*, p. 60.

Snout very long and slender; teeth $\frac{27 \text{ or } 28}{25 \text{ or } 26}$ *Gavialis*, p. 63.

CROCODYLUS, Cuv.

Teeth strong, very unequal in size, 18 or 19 above, and 15 below, on each side, the teeth in the upper jaw being the strongest; the fourth tooth of the lower jaw passes into a groove at the lateral edge of the upper jaw§. Snout moderately long. The posterior nuchal plates are separated from the dorsal by an interspace.

* Tennent's Nat. Hist. Ceylon, p. 288.

† Journ. As. Soc. Bengal, xxii. p. 465.

‡ Alligators are found only in the New World, but the English in India almost universally apply this name to the Indian Crocodiles.

§ The fourth tooth, normally, ought to be visible when the mouth is closed; however, we have seen young specimens of true Crocodiles in which that tooth passed into a groove, as described, on one side, whilst its fellow on the other side was received into a pit as in the Alligators.

The Crocodiles are found in America, Africa, Asia, and Australia. The following species are found in British India:—

* *A series of anterior nuchal plates*: Bombifrons, Gray.

The width of the interorbital space is much less than the vertical diameter of the orbit *C. palustris*, p. 61.

The width of the interorbital space is nearly equal to the vertical diameter of the orbit *C. siamensis*, p. 61.

** *Anterior nuchal plates none*: Oopholis, Gray.

Dorsal plates in six longitudinal series *C. porosus*, p. 62.

Dorsal plates in four longitudinal series *C. pondicerianus*, p. 62.

CROCODILUS PALUSTRIS. (Plate VIII. fig. A.)

Crocodylus palustris, Less. in *Bélang. Voy. Ind. Orient., Zool., Rept.* p. 305. Gray, *Catal. Tort. &c.*, 8vo, p. 62.

— *vulgaris*, var. B, Dum. & Bibr. *Erpét. gén.* iii. p. 108. Cantor, *Mal. Rept.* p. 15.

— *trigonops*, Gray, *Catal. Tort. &c.*, 8vo, p. 62.

— *bombifrons*, Gray, *l. c.* p. 59. Huxley, *Proc. Linn. Soc.* 1859, pp. 13, 28.

— *biporcatus*, Cautley, *As. Research.* xix. tab. 3. figs. 1 & 3 (not Cuv.).

Bombifrons trigonops, Gray, *Ann. & Mag. Nat. Hist.* 1862, x. p. 269.

The upper surface of the snout is covered with numerous small, rounded, irregular prominences. Interorbital space deeply concave, its width being much less than the vertical diameter of the orbit; two pairs of strongly keeled anterior nuchal plates; three pairs of large posterior nuchal plates, each with an exceedingly strong keel—the plates of the outer pair not much smaller than the middle plates. Six shields in each of the transverse rows of the middle of the back; sixteen transverse rows of dorsal shields; each shield with a strong keel.

The British Museum possesses specimens from Madras, from Malabar, from Ceylon, and from the Ganges; it attains probably to the same size as *Croc. porosus*. The figure on Plate VIII. is taken from a Madras specimen, and represents the head of half its natural size.

CROCODILUS SIAMENSIS. (Plate VIII. fig. B.)

Crocodylus siamensis, Schneid. *Hist. Amph.* p. 157.

— *galentus*, Cuv. *Ann. Mus. Hist. Nat.* x. p. 51. pl. 1. fig. 9 (skull of an adult).

Bombifrons siamensis, Gray, *Ann. & Mag. Nat. Hist.* 1862, x. p. 269.

The upper surface of the snout without prominences, and almost smooth. Interorbital space moderately concave, its width being nearly equal to the vertical diameter of the orbit; two pairs of strongly keeled anterior nuchal plates; two pairs of large posterior nuchal plates, each with an exceedingly strong keel. Four or six shields in each transverse row on the back; sixteen transverse rows of dorsal shields; each shield with a strong keel.

This species was first described from a skull, sent by French Missionaries from Siam to the Paris Museum; but the first entire animal appears to have been brought to Europe by the late M. Mouhot, who procured it in Gamboja. Adult animals of 10 feet in length show a longitudinal prominence in the middle, behind the posterior angles of the orbit. Our specimen, being only $4\frac{1}{2}$ feet long, has this prominence slightly, but distinctly, indicated; we have figured its head of half its natural size.

CROCODILUS POROSUS.

Crocodylus porosus, *Schneid. Amph.* p. 159. *Cantor, Mal. Rept.* p. 16. *Jerd. Journ. As. Soc. Beng.* xxii. p. 466.

— *biporcatus*, *Cuv. Oss. Foss.* v. pt. 2. p. 65. tab. 1. figs. 4, 18, 19 (young skulls), & tab. 2. fig. 8.

Müll. & Schleg. Krokod. Ind. Archipel. tab. 3. fig. 6 (middle-aged skull), fig. 7 (aged).

Opholia porosus, *Gray, Ann. & Mag. Nat. Hist.* 1862, x. p. 267.

Anterior nuchal plates none, or only a pair of very small ones. Dorsal shields in six longitudinal series; generally another rudimentary series on each side of the middle of the back, so that there are eight shields in a part of the transverse series; each shield with a keel. Dorsal shields in seventeen * transverse series (to the root of the tail).

This is a very common species along all the rivers of the East Indian continent and Archipelago. The specimens found in Australia scarcely differ from those from the East Indies. It grows to the very large size of 30 feet, and specimens from 15–20 feet are by no means rare.

CROCODILUS PONDICERIANUS. (Plate VII.)

Opholia pondichrianus, *Gray, Ann. & Mag. Nat. Hist.* 1862, x. p. 268.

Anterior nuchal plates none. Dorsal shields in four longitudinal series; another rudimentary series on each side of the middle of the back; each shield with a keel. Dorsal shields in seventeen transverse series. Fore toes half webbed; the two outer of the hind toes completely webbed.

Only one specimen is known of this species; it is quite young, 12 inches long, and is said to have been brought from Pondicherry.

* Australian specimens have only sixteen transverse series.

GAVIALIS, Geoffr.

Teeth slender, subequal in size, 27 or 28 above, and 25 or 26 below, on each side; the strongest teeth anteriorly in the jaws; teeth directed outwards. Snout very long and slender.

Only one species is known from the Ganges,—the Gavial from Borneo (*Crocodilus schlegelii*) having been rightly referred by Huxley to a distinct genus (*Rhynchosuchus*).

GAVIALIS GANGETICUS. *The Gavial or Nakoo.*

Lacerta gangetica, *Gm. Syst. Nat.* i. p. 1057.

Crocodilus longirostris, *Schneid. Hist. Amph.* p. 100. *Cuv. Oss. Foss.* v. pt. 2. p. 60. pl. 1. figs. 2 & 10, & pl. 2. fig. 11 (head and skull).

— *tenuirostris*, *Cuv. l. c.* p. 62. pl. 1. figs. 1 & 11, & pl. 2. fig. 12.

The length of the snout equals that of nine or ten of the dorsal shields. The upper jaw with twenty-seven slender and slightly curved teeth, the lower with twenty-six. The strongest of all the teeth are the two anterior lateral ones of the upper jaw, and those of the first, second, and fourth pairs of the lower jaw. There is a transverse series of four or six smallish shields at a short distance behind the occiput; another pair of very small shields occupies the space between that series and the anterior dorsal shields. The dorsal shields commence in the middle of the length of the neck, and form twenty-two transverse rows to the root of the tail. The first transverse row is composed of two shields only, whilst the two following have a small additional shield on each side; in the middle of the back each transverse row is composed of six shields—four large ones and two small lateral ones; each shield is keeled.

Old male specimens have a large cartilaginous hump on the extremity of the snout*, perforated by the nostrils and containing a small cavity for the reception of air, so that the males are enabled to remain under water for a longer time than the females.

The Gavial attains to a length of 20 feet.

FAMILY OF WATER LIZARDS—VARANIDÆ.

Head with the snout produced, pyramidal, covered with small, scale-like, but not imbricate, shields. Teeth acute, compressed. Tongue elongate, slender, terminating in a long fork, retractile into a sheath at its base. Scales small, equal on the sides and on the back, arranged in cross rings; those of the belly and tail square, in cross bands. Tail long, generally compressed. Toes 5—5, armed with strong claws.

* This is referred to by Ælian, who says that the Ganges is inhabited by Crocodiles which have a horn on the end of the snout (*Hist. Anim.* lxi. c. 41).

This family contains the largest species of Lizards; the greater part of them live in the neighbourhood of large rivers, and are excellent swimmers, their long, compressed tail serving as a propeller; they are carnivorous, feeding on all the different water-animals and on the eggs of birds, and likewise on those of other large reptiles.

Their movements on land are not much less rapid than in the water. Several species climb trees; they are active during a part of the night. The external nasal opening leads into a spacious cavity situated on the snout; when the animal dives, it closes the nasal aperture, and retaining a certain quantity of atmospheric air in that pouch, or rather in the two pouches, it is enabled to remain under water for a prolonged period without the necessity of rising to the surface in order to breathe. It is the same plan of structure as that with which a large northern Seal (*Cystophora borealis*) is provided.

They are found in the tropical parts of Africa, Asia, and Australia. The species of British India belong to the following genera:—

- Nostrils an oblique slit, in, or nearly in, the middle between eye and
 extremity of snout *Varanus*, p. 64.
 Nostrils a more or less rounded opening, near the extremity of the snout . . . *Hydrosaurus*, p. 67.

VARANUS.

Varanus (part.), *Merr. Amph.* p. 58.

The nostrils are an oblique slit, situated in, or nearly in, the middle between the eye and the extremity of the snout. Scales elliptic, small; those on the back and on the sides not imbricate, each being surrounded by a small, circular, granular fold. Tail with a low crest, formed by two or four series of strongly keeled scales. Throat with a transverse fold.

The species are the following:—

- The free part of the middle fore toe (without claw) is half as long as the snout . . . *V. flavescens*, p. 65.
 The free part of the middle fore toe (without claw) is much longer than the half
 snout; all the superciliary scales equally small. Ventral scales in 90 trans-
 verse series. Neck without angular dark cross bands *V. dracæna*, p. 65.
 The free part of the middle fore toe (without claw) is much longer than the half
 snout; all the superciliary scales equally small. Ventral scales in 105 trans-
 verse series. Neck with dark angular cross bands, their points being directed
 backwards *V. innatus*, p. 66.
 Superciliary scales small, with a series of larger ones along the middle *V. nebulosus*, p. 66.

VARANUS FLAVESCENS. *The Short-toed Water Lizard.* (Plate IX. figs. A, A'.)

Monitor flavescens, Gray, *Illustr. Ind. Zool.* c. tab.

Varanus piquotii, Dum. & Bibr. *Erpét. gén.* iii. p. 485. pl. 35. fig. 5 (scales).

Empagusia flavescens, Gray, *Lizards*, p. 9.

Varanus flavescens, Cantor, *Mal. Rept.* p. 28.

The toes of this species are, comparatively, shorter than in its congeners. The nostril is an oblique slit, situated entirely before the middle of the length of the snout, although not on its extremity. The teeth are of moderate size, subconical, scarcely compressed, and not denticulated. Superciliary scales of unequal size, the outer being rather smaller than the inner. Scales of the upper parts strongly keeled, those of the belly smooth, in 70 transverse series between the gular fold and the loin. Greenish- or brownish-olive, with irregular dark markings, which are, generally, confluent into broad cross bars on the back and tail; throat with irregular dark transverse bands. In young specimens the dark colour is predominant on the upper parts, the body and tail being crossed by numerous irregular yellow bands.

This species attains to a length of from 3 to 4 feet, the tail being longer than the body. It has been found in Nepal (by Mr. Hodgson), in Bengal, at Pinang, and in the Indus Territories. On Plate IX. we have figured the head (fig. A), and the fore foot (fig. A'), to show the position of the nostril and the short toes.

VARANUS DRACÆNA. *The Common Indian Water Lizard.* (Plate IX. figs. B, B', B'').

? *Lacerta dracæna*, L. *Syst. Nat.* i. p. 360.

Lacerta dracæna, Shaw, *Zool.* iii. p. 218. pl. 67.

Tupinambis bengalensis, Daud. *Hist. Rept.* iii. p. 67.

Varanus guttatus, Merr. *Amph.* p. 58. Less. in *Bélang. Voy. Ind. Orient., Rept.* p. 308.

— *punctatus*, Merr. *Amph.* p. 59. Less. *l. c.* p. 309.

Monitor heraldicus, Gray, in *Griff. An. Kingd.* ix. p. 25.

— *bengalensis*, Gray, *l. c.* p. 26.

Varanus bengalensis, Dum. & Bibr. *Erpét. gén.* iii. p. 480.

— *heraldicus*, Gray, *Catal. Liz.* p. 9.

Monitor dracæna, Gray, *l. c.* p. 11.

Varanus bibroni, Blyth, *Journ. As. Soc. Beng.* xi. p. 869, and in *Kelaart, Prodr. Faun. Ceyl. App.* p. 46.

The toes of this and of the following species are of moderate length, and armed with strong claws. The nostril is an oblique slit, situated in the middle of the length of the snout. The teeth are stout, subconical, and not denticulated. Superciliary scales small, without a series of larger ones. Scales of the neck and back without keels, only a little raised in the middle; those of the belly smooth, in 90 transverse series between the gular fold and the loin. Brownish olive, uniform or generally with more or less numerous black dots, each of which occupies a scale; these dots are sometimes arranged in irregular transverse series, and are most numerous on the throat. Young specimens show numerous small white ocelli edged

with darker, whilst the lower parts are marked with irregular dark transverse bands. Nape of the neck without regular cross bands.

This appears to be the most common species in British India. Specimens have been obtained from Bengal and Nepal, from different parts of Southern India, and from Ceylon. A very young specimen, 10 inches long, brought by Captain R. H. Beddome from the Anamallay Mountains, shows narrow black bands across the neck; but they are much narrower than in *V. lunatus*, and rather irregular. It sometimes exceeds a length of 4 feet, the tail being longer than the body.

Kelaart (Prodr. Faun. Ceyl. p. 147) says that it is called in Ceylon the "*Goana*." "It is found in great abundance in all the maritime provinces, rarely in the higher Kandian districts. The natives are partial to its flesh; we have once tasted some excellent soup made from a tender Goana; it tasted not unlike hare-soup. They live in holes, and in midday they steal out of their cells in search of food, which consists of smaller reptiles and insects. Ant-hills furnish them with a dainty repast. At Trincomalee they are hunted down by dogs, and sold in the market for sixpence each."

Figures B, B', B'' of Plate IX. represent the head in two views, and the fore foot, of the natural size.

VARANUS LUNATUS. *The Banded Water Lizard.* (Plate IX. fig. C.)

Varanus lunatus, Gray, *Lizards*, p. 10.

This species is very similar to *V. dracæna*, from which it is distinguished by a larger number of ventral shields, which are arranged in 105 cross series from the gular fold to the loin. Neck, trunk, and tail marked with cross bands, which are as broad as the interspaces of the ground-colour; these bands are angular on the neck and trunk, with the angle directed backwards on the neck and forwards on the trunk—four on the neck, eleven on the trunk. Sides and legs dotted with white.

The single (typical) specimen in the British Museum is stuffed, and 25 inches long, the tail having a length of 14 inches. It is marked as coming from India, but without further information.

VARANUS NEBULOSUS. *The Clouded Water Lizard.* (Plate IX. fig. D.)

Monitor nebulosus, Gray, in *Griff. An. Kingd.* ix. p. 27.

Varanus nebulosus, *Dum. & Bibr. Erpét. gén.* iii. p. 483. ? *Cantor, Cat. Mal. Rept.* p. 27.

The toes are as long as in *V. dracæna*, and armed with very acute claws. The nostril is a long slit, and situated nearer to the eye than to the end of the snout. The teeth are slightly

compressed, of moderate strength, and not denticulated. A series of broad, enlarged shields runs along the middle of the superciliary region, which otherwise is covered with small scales. Scales of the neck and back with an obtuse keel; those of the belly smooth, in 80 transverse series between the gular fold and the loin. Greenish- or brownish-olive, irregularly marbled and dotted with yellowish and black. Nape of the neck with traces of two pairs of blackish bands, convergent behind, the anterior band proceeding from the eye. Young specimens have these bands very distinct, and the body ornamented with numerous white, black-edged ocelli.

The largest specimen which I have seen is $3\frac{1}{2}$ feet long, the tail being longer than the body. This species is found in Bengal and Siam, but not in Java as stated by Bibron; perhaps near Pinang.

HYDROSAURUS, *Wagl.*

This genus differs from *Varanus* only in its nostrils, which are a more or less rounded opening near the extremity of the snout.

Only one species is known to inhabit the East Indian continent; it is named—

HYDROSAURUS SALVATOR. *The Ocellated Water Lizard.* (Plate IX. fig. E.)

- Stellio salvator, *Lawr. Syn. Rept.* p. 56.
 Tupinambis bivittatus, *Kuhl. Beitr. Zool.* p. 125.
 Monitor elegans, *Gray, Zool. Journ.* iii. p. 225.
 Varanus vittatus, *Less. in Bélanger. Voy. Ind. Orient., Rept.* p. 307.
 — bivittatus, *Dum. & Bibr. Erpét. gén.* iii. p. 486.
 Hydrosaurus salvator, *Gray, Lizards*, p. 13.
 Varanus salvator, *Cantor, Catal. Mal. Rept.* p. 29.
 Monitor bivittatus, *Schleg. Abbild.* p. 76. tab. 21, & tab. 22. figs. 1, 2.

The toes are as long as in the long-toed *Varani*, and armed with sharp claws of moderate size. The teeth are strong, slightly compressed and curved backwards, not serrated. A series of broad, enlarged shields covers the inner half of the superciliary region. Scales of the neck and back with a very obtuse keel; those of the belly smooth, in 90 transverse series between the gular fold and the loin. Dark brown above, with transverse series of round white spots; snout with three or four white cross bands; a dark-brown streak runs from the eye to the neck; throat and sometimes the belly with irregular dark-brown transverse streaks; tail with white rings. All these markings become more and more obscure with advancing age, and, finally, may disappear entirely.

This species is an inhabitant of the islands of the East Indian Archipelago; the British

Museum, however, has received two examples from the continent—one from China, by Mr. J. Lindsay, and the other from Siam, by Sir J. Bowring.

Kelaart (Prodr. Faun. Ceyl. p. 148) and Blyth (Journ. As. Soc. Beng. xxii. p. 476) state that it also occurs in Ceylon, whence we have never received it.

According to Cantor it is "very numerous in hilly and marshy localities of the Malayan peninsula. It is commonly during the day observed in the branches of trees overhanging rivers, preying upon birds and their eggs and smaller lizards, and when disturbed, it throws itself from a considerable height into the water; it will courageously defend itself with teeth and claws and by strokes of the tail. The lowest castes of Hindoos capture these lizards commonly by digging them out of their burrows on the banks of rivers, for the sake of their flesh, which by these people is greatly relished. Some individuals attain to nearly 7 feet in length."

FAMILY OF LAND LIZARDS—*LACERTIDÆ*.

Head covered with shields, which are symmetrically arranged. Tongue slender, free, exsertile, terminating in a fork. Scales on the back granular or rhombic, on the sides granular; on the belly larger, quadrangular or rounded, and arranged in cross bands. No longitudinal fold along the sides, but generally a fold across the throat. Tail very long, rounded, with the scales arranged in rings; fragile. Eyes diurnal, with eyelids; tympanum distinct. Limbs four, well developed.

The species of this family do not attain to any considerable size; most of them are found in Africa, America, and Europe. They live generally on the ground, and are not burrowing.

Only the following genera occur on the East Indian continent:—

Inguinal pores only	<i>Tachydromus</i> , p. 69.
Femoral pores; toes not toothed on the sides; eyelids present . . .	<i>Cabrita</i> , p. 71.
Femoral pores; toes not toothed on the sides; eyelids none . . .	<i>Ophiops</i> , p. 72.
Femoral pores; toes toothed on the sides	<i>Acanthodactylus</i> , p. 72.

TACHYDROMUS, *Daudin*.

Head elongato-pyramidal, body subcylindrical, tail very long. Nostril in a single nasal shield immediately above the labials. Dorsal scales large, strongly keeled, the keels being confluent into longitudinal ridges; all the ventral shields, or at least the lateral ones, keeled. Sides covered with granular scales. Anal shield surrounded by smaller ones; one or two inguinal pores on each side. Femoral pores none. Tail with rings of keeled, quadrilateral shields. An indistinct collar. Toes not serrated or keeled. Tympanum distinct.

Synopsis of the Species.

* All the ventral shields are keeled; three pairs of chin-shields.

1. Dorsal scales in four, ventral shields in ten† longitudinal series; ventral shields in twenty-two or twenty-three transverse rows. Generally two inguinal pores on each side of the vent: *Tachydromus sexlineatus*, Daud., from Rangoon, Borneo, and probably from other islands of the East Indian Archipelago.
2. Dorsal scales in four, ventral shields in twelve longitudinal series; one inguinal pore on each side of the vent: *Tachydromus meridionalis*, n. sp., from Southern China.
3. Dorsal scales in six series: *Tachydromus septentrionalis*, n. sp., from Ningpo.

** Only the lateral ventral shields are keeled; four pairs of chin-shields.

4. Dorsal scales in six, ventral shields in eight series; inguinal pores two on each side: *Tachydromus japonicus*, Dum. & Bibr., from Japan.

TACHYDROMUS SEXLINEATUS. (Plate VIII. fig. C.)

Tachydromus sexlineatus, Daud. *Rept.* iii. p. 256. tab. 39. Dum. & Bibr. *Erpét. gén.* v. p. 158.

— *quadrilineatus*, Daud. *l. c.* p. 252.

— *typicus*, Gray, in *Ann. & Mag. Nat. Hist.* i. p. 389.

Three pairs of chin-shields. Dorsal scales strongly keeled, in four longitudinal series; all the ventral shields are keeled, and form ten longitudinal and twenty-two or twenty-three transverse series. Generally two inguinal pores on each side of the vent. Greenish bronze-coloured above, sometimes with a pair of silvery bands; sides greenish, separated from the brown of the back by a narrow black streak, commencing at the nostril and passing through the eye and tympanum. The lower parts yellowish, iridescent.

We have specimens of this species from Rangoon and from Borneo; it probably occurs also in other parts of the East Indian Archipelago. The largest specimen is 14 inches long,

† "Six séries longitudinales" (Dum. & Bibr. v. p. 160) is probably a misprint.

of which the tail takes $11\frac{1}{4}$. The figures marked C, on Plate VIII., show the four dorsal series of scales and the two pairs of inguinal pores.

TACHYDROMUS MERIDIONALIS. (Plate VIII. fig. D.)

This species has hitherto been confounded by Herpetologists with *T. seltineatus*; we have four specimens before us, which show that the characters by which we distinguish this species are constant. It is as slender as the species from the East Indian Archipelago, with the snout produced and with the tail exceedingly long. The arrangement of the head-shields is the same in all the four species, except that *T. japonicus* has four pairs of chin-shields: one prefrontal, two postfrontals, one vertical, two pairs of occipitals with one or two odd central ones, the anterior occipitals being much smaller than the lateral. The nasal opening is in a single shield, immediately above the first labial; one frænal, one anteorbital, six upper and five lower labials; temples covered with very small keeled scales. The scales on the back are rounded behind; a strong ridge along each of the series of scales. The scales on the throat are similar to, and gradually pass into, those of the belly, the collar being very indistinct; there is a small fold before each shoulder. The ventral shields are subquadrangular, imbricate, obtusely pointed behind, and arranged in twelve longitudinal and twenty-five transverse series. The scales on the tail are arranged in rings and strongly keeled, the keels forming continuous ridges as on the back and belly. Limbs slender, rather feeble; the anterior do not extend to the end of the snout, nor the posterior to the axil. Claws very feeble. Only one inguinal pore on each side.

Back brownish olive; a dark-brown band runs from the snout, through the eye, above the tympanum, to the loin; this band is separated from the colour of the back by an iridescent lateral stripe.

This species is found in Southern China, and probably also in Cochinchina.

Length of the head 5 lines, of the trunk 18 lines, of the tail $7\frac{1}{4}$ inches. The two figures marked D, on Plate VIII., show the four dorsal series of scales and the single inguinal pore on each side.

TACHYDROMUS SEPTENTRIONALIS. (Plate VIII. fig. E.)

This species, the most northern of the *Tachydromi*, is more closely allied to the Japanese species than to any other; yet it is so different from the latter in several respects, that it could not be referred to Gray's genus *Trachysaurus*, established for *T. japonicus*. In form it is much less slender than *T. meridionalis* and *T. seltineatus*; in the arrangement of the head-shields it differs but little from *T. meridionalis*: there is a small detached shield between anteorbital and eye, and there are seven upper and six lower labials. The two vertebral series of scales are much smaller than the lateral ones. The ventral shields are as strongly keeled as those on the back, and arranged in twenty-eight transverse and in eight longitudinal

series; there are, however, two other rudimentary series of small, keeled scales on each side of the belly. The fore limbs extend to the end of the snout, the hind limbs nearly to the axil. The claws are feeble, and each has at its base a small, dilated disk belonging to the skin of the toe.

Back brownish- or greenish-olive; a brown band, darkest on its edges, runs from the nostril through the eye to the tympanum, and is soon lost. There is a green, iridescent, black-edged band on each side of the back in old specimens. Lateral parts greenish, the lower yellowish.

Two specimens have been procured at Ningpo.

Length of the head $\frac{3}{4}$ of an inch, of trunk 2 inches, of tail (reproduced) 7 inches. We have given a figure of the whole animal; and outlines of the lower jaw, of the anal region, and of a portion of the back, to show the six dorsal series of scales.

CABRITA, *Gray*.

Nostrils on the ridge of the snout, between an upper and lower nasal plate, both being rather swollen; a small hinder nasal. Eyelids present; collar none, only a small fold before each shoulder. Ventral scales four-sided, smooth, longitudinally arranged. Femoral pores. Toes 5—5, keeled beneath, not toothed on the sides.

I have not had an opportunity of examining this Lizard, which is known from descriptions drawn up by Milne-Edwards, Bibron, and Gray.

CABRITA LESCHENAUTII.

Lacerta leschenautii, *Milne-Edw. Ann. Sc. Nat.* xvi. pp. 80, 86. pl. 6. fig. 9 (head).

Calosaura leschenautii, *Dum. & Bibr. Erpét. gén.* v. p. 262.

Cabrila brunnea, *Gray, Ann. Nat. Hist.* i. p. 282.

Two loreals; the central occipital very small. The lower eyelid transparent; temples with small, hexagonal, keeled scales of equal size. Dorsal scales keeled, rhombic. Ventral scales in six longitudinal and twenty-five or twenty-six transverse series. Vent covered with a larger central scale, surrounded by other small ones. Fifteen or sixteen femoral pores. Brown, with two broad whitish bands on each side, the upper arising from the superciliary and running along the side of the back, the lower proceeding from below the eye and ear along the middle of the side.

Total length $5\frac{1}{2}$ inches, of head and trunk 2 inches.

The specimens in the Paris Museum are said to be from the coast of Coromandel. Jerdon (Journ. As. Soc. Bengal, xxii. p. 476) says that he has recognized the species: "it is somewhat locally distributed. I have seen it in the Salem and Coimbatore districts only, especially near the banks of the Cavery. It frequents bushy ground, hedges of Euphorbia and clumps of Cactus." Mr. Blyth adds that the Museum at Calcutta contains examples of what he takes to be this species, from Pind Dadun Khan, in the Punjab Salt Range; and that it formerly possessed the same from Afghanistan.

OPHIOPS, *Ménétriés*.

Nostrils on the ridge of the snout, between an upper and lower nasal plate, both being rather swollen; three small shields behind the nostril. Eyelids none; collar none, only a small fold before each shoulder. Ventral shields four-sided, rhombic, smooth; scales on the back rhombic, keeled, imbricate. Femoral pores. Toes 5—5, keeled beneath, not toothed on the sides.

Mr. Blyth refers to this genus a species which we have not seen:—

Ophiops jerdoni (Journ. As. Soc. Beng. xxii. p. 653):—"Dark bronze above, black-spotted, with two obscure broad dorsal streaks; below white throughout. Femoral pores seven or eight. Shields of head plaited longitudinally. Length of head and body $1\frac{1}{2}$ inch, of tail $2\frac{1}{4}$ inches, of hind limb $\frac{3}{4}$ inch. Procured at Mhow, in pasture land, by T. C. Jerdon, Esq."

ACANTHODACTYLUS, *Fitzinger*.

Nostril between three shields, the lower of which is the first labial. Eyelids present; a scaly fold across the throat. Ventral scales four-sided, smooth. Femoral pores. Toes 5—5, keeled beneath, and toothed on the sides.

The species hitherto known of this genus are African; but it also appears to be represented in the East Indies: Jerdon refers a Lizard from the Nilgherries to this genus; and I have also found an *Acanthodactylus* in the late East India Company's Collection, stated to be from Hindostan. Following is the description from which we are expected to recognize the species discovered by Mr. Jerdon; it appears to differ from the other (*A. cantoris*) in its coloration:—

Acanthodactylus nilgherrensis, Jerd. (Journ. As. Soc. Beng. xxii. p. 476):—"Anterior edge of ear toothed, scaly; collar transverse; scales of back somewhat larger behind than in front; an occipital plate.—This

Lizard was obtained by W. Elliott, Esq., near Coonoor. Its colours in spirits are of a pale pearl-grey, with a row of black spots on its back, another row on its sides somewhat larger and white, edged black. Length of one 5½ inches, of which the tail is 3."

ACANTHODACTYLUS CANTORIS.

Head of moderate length, with the snout narrowed; body and root of the tail rather depressed; limbs well developed.

Rostral shield bent backwards on the upper surface of the snout, with an obtuse angle behind; supranasals meeting each other behind the rostral; præfrontal nearly square; posterior frontals longer than broad, each with an obtuse longitudinal keel; vertical bell-shaped, broadest in front, narrow and elongate behind, with two convergent obtuse keels. Superciliaries three, the anterior of which is small; they are separated from the orbital margin by a narrow strip of small scales. Two pairs of occipitals: the anterior pair small, triangular, the posterior twice as large and subquadrangular; a very small central occipital is also present. The nostril is situated between the supranasal, the first labial, and a small post-nasal. Eight upper labials; an elongate shield below the orbit and above the fifth, sixth, and seventh labials. The mental shield is nearly as long as broad; seven rather narrow lower labials; a series of five chin-shields runs along the inner side of the labials (the third is the largest); the first three pairs of these chin-shields touch each other in the median line, whilst the shields of the fourth and fifth pairs are separated from each other by small, smooth scales. These scales gradually increase in size towards the collar, and those in front of the collar are as large as the anterior ventral scales. Scales on the cheek obtusely keeled, small, but much larger than those on the neck; no lobules or larger scales in front of the ear.

All the scales on the upper side of the body are strongly keeled, imbricate, obtusely pointed behind; they are exceedingly small on the neck, but become gradually larger towards the middle and hind part of the body; they form thirteen longitudinal rows in the middle of the back, the keels forming continuous lines. The scales on the side of the trunk are much smaller than those of the back, and keeled. Ventral scales in twelve longitudinal series in the middle of the belly, smooth, square; those near the throat are rhombic. Preanal region covered with scales similar to those near the collar, the last being larger than the others. The scales of the tail are keeled and disposed in rings.

Twenty pores on each side; the perforated scales form a continuous angular series across the præanal region. The fore limbs extend to the front edge of the orbit, if laid forwards, the hind limbs to the collar. The hind toes are very distinctly serrated along their external margins.

Greenish olive above, with reticulated blackish lines; uniform whitish below.

Total length 7 inches:—head 7 lines; tail $4\frac{1}{2}$ inches; fore limb 11 lines; fourth (longest) finger $3\frac{1}{2}$ lines; hind limb 18 lines; third toe $3\frac{1}{2}$ lines; fourth (longest) toe 6 lines; fifth toe 5 lines.

The British Museum received the example on which I have founded this species from the East India Collection, to which it had been presented by Dr. Cantor; it is stated to be from Ramnuggar.

FAMILY OF CORDYLES—*ZONURIDÆ*.

Head covered with regular, symmetrical, many-sided shields. Tongue flat, nicked. Scales of the back and tail large, squarish; sides with a distinct longitudinal fold; scales of the belly square or roundish, in cross bands. Tail rounded. Ears distinct; eyes diurnal, with lids.

Only one species of this family is found in the East Indies.

PSEUDOPUS.

Pseudopus et *Hyalinus*, *Merrem*.

Seps (part.) et *Ophisaurus*, *Daudin*.

Pseudopus, *Ophisaurus*, et *Dopasia*, *Gray*.

Ophiseps, *Blyth*.

Body and tail long, snake-like, without limbs, or with only one pair of rudimentary hind legs. Scales quadrangular, arranged in transverse series.

Three species only of this very remarkable genus are known: one from North America, *Ophisaurus ventralis*, with the palatine teeth in a broad band; the second from South-Eastern Europe and Northern Asia, *Pseudopus pallasii*, with rudimentary hind limbs; and, finally, the *Ps. gracilis* from Khasya.

Pseudopus gracilis. The Khasya Glass Snake.

Pseudopus gracilis, Gray, *Lizards*, p. 56.

Dopasia gracilis, Gray, *Ann. & Mag. Nat. Hist.* xii. 1853, p. 389. *Günth. Proc. Zool. Soc.* 1860, p. 172.

Ophiseps tessellatus, Blyth, *Journ. As. Soc. Beng.* xxii. p. 655.

This species is very closely allied to its European congener, differing, however, from it by the total absence of the rudimentary, scale-like hind limbs of that species. From the North American Glass Snake it differs in having the palatine teeth small, and arranged in a very narrow band. The upper surface of its head is covered with a large vertical plate and three smaller occipitals behind, the space between the vertical and the rostral being filled up by about five pairs of rather irregular frontals of unequal size; the superciliaries are arranged in two series. The dorsal scales form fourteen longitudinal series, each series with a slight continuous keel; the ventral scales are smooth, in ten series. The upper parts are brown, with some irregular black spots across the back.

The typical specimen is from the Khasya Hills, 15 inches long, the tail measuring 10. We may infer, from its close resemblance to *Pseudopus pallasii*, that its habits are similar. It probably lives in dry places, under stones, feeding on small lizards, mice, &c.* The scaly covering of the upper and lower parts is so tight, that it does not admit of the same extension as in snakes or other lizards, and the *Pseudopus*, therefore, could not receive the same quantity of food in its stomach as those animals were it not for the expansible fold of the skin running along each side of its trunk. Whilst in other Saurians the whole skin of the belly and of the sides is extensible, the extensibility here is limited to a separate part of the skin.

FAMILY OF SKINKS—SCINCIDÆ.

Head covered with shields, which are symmetrically arranged. Tongue slender, free, exsertile, terminating in two pointed lobes. Scales on the back rounded, quincuncial, imbricate; those on the belly similar to those on the back and on the sides. No fold across the throat or along the side; no femoral or inguinal pores. Tail generally long, rounded, fragile. Eyes and eyelids well developed. Nostrils in a separate plate, between the frontal and labial shields. Generally four limbs, moderately developed, sometimes feeble or hidden below the skin.

The species of this family are exceedingly numerous, and inhabit almost every part of the

* Mr. Blyth's "*Ophiseps*" is said to be from Rangoon.

tropical regions, some extending into the temperate zones. They are thoroughly land Lizards, preferring dry ground, and hiding themselves in the sand, under stones, &c.; none of them enter the water. They do not attain to any considerable size, a few West Indian and Australian species growing to the thickness of a man's wrist, and exceeding a foot in length. They deposit from eight to twelve globular eggs. The species of British India belong to the following genera:—

* Tail spinose.

Two or three large præanal plates *Tropidophorus*, p. 76.

** Tail without any spines.

Scales keeled *Euprepes*, p. 78.

Scales smooth; toes 5—5; the palatal notch is on a level with the eye . . *Mabouia*, p. 82.

Scales smooth; toes 5—5; the palatal notch is behind the level of the eye . *Eumeces*, p. 84.

Scales smooth; toes 5—4 *Hagria*, p. 94.

Scales smooth; toes 4—4 *Chamela*, p. 95.

(No external limbs *Anguis*, p. 95.)

TROPIDOPHORUS, *Dum. & Bibr.*

Each scale with a strong keel; tail longish, rounded, the keels of the scales being very prominent, forming series of spines. Nostril in a single small shield. Two or three large præanal shields. Limbs four, moderately developed, each with five toes.

The Lizards of this genus are found on the continent of India and in the Philippine Islands. They are Skinks, but with the keels of the scales much developed, which gives them quite a peculiar appearance. Only three species are known:—

Keels of the scales exceedingly strong *T. grayi*, Gthr.*

Keels of the scales moderately developed; three præanal shields . . . *T. microlepis*, p. 76.

Keels of the scales moderately developed; two præanal shields . . . *T. cochinchinensis*, p. 77.

TROPIDOPHORUS MICROLEPIS. (Plate X. fig. A.)

Tropidophorus microlepis, *Günth. Proc. Zool. Soc.* 1861, April 23, p. 188.

Snout rather narrow and produced; head covered with symmetrical rugose shields above: a single anterior frontal, two postfrontals; a cuneiform vertical much narrowed between the superciliaries; two small anterior occipitals, and two larger posterior, with an elongate

* *Proc. Zool. Soc.* 1861, April 23, p. 189, from the Philippine Islands.

central shield between; four supraorbitals. The nostril is in a small single lateral shield between the first labial and præfrontal; there are two other shields between the nasal and the orbit. Five upper and as many lower labials. A single chin-shield in front, behind the median lower labial; three other pairs of chin-shields behind the single one, the shields of the last pair being separated by scales. Temple covered by small keeled scales. The dorsal scales are arranged in seven or eight longitudinal series; the lateral scales are smaller, disposed in series descending obliquely backwards; there are about ten scales in each oblique series; the scales of the belly are nearly smooth, in eight longitudinal series. Præanal scales three, nearly equal in size. Back of the tail with two series of spinous keels which are moderately elevated, and not corresponding to two similar series on the trunk; they are confluent at the root of the tail, and pass into the series of scales in the middle of the back; there are five serrated keels on each side of the tail; subcaudals in a single series, larger and broader than the ventral scales.

The lower eyelid is scaly; tympanum as large as the orbit.

Brownish grey, slightly marbled with darker; toes and lower part of the tail dotted with brown.

We have seen only one specimen of this species, from Chartaboum, on the coast of Siam. It is $5\frac{1}{2}$ inches long, the tail measuring $3\frac{1}{2}$; and is figured on Plate X., of the natural size, figures *a*, *a'*, *a''* representing the head and anal region.

TROPIDOPHORUS COCHINCHINENSIS.

Leposoma cochinchinensis, Cuv. *Règne Anim.*

Tropidophorus cocincinensis, Dum. & Bibr. v. p. 556. pl. 57. f. 1. Günth. l. c.

Tropidosaurus montanus, Gray, in Griff. *An. Kingd.* ix. p. 35.

This species is closely allied to *T. microlepis*, but its snout is rather more obtuse. Scales on the back strongly keeled, the keels terminating in slightly elevated spines. Two series of moderately elevated spines along the middle of the back of the tail, the series being continuous with two series of the back of the trunk. Præanal shields two, large. Two præfrontals.

Cochinchina.

Aspris berdmorei (Blyth, Journ. As. Soc. Beng. xxii. p. 650), from Mergui, is probably another species of this genus, but the description given does not contain any definite characters; it would appear to agree with *T. cochinchinensis* in having only two præanals, and with *T. microlepis* in having a compressed and subacute snout.

EUPREPES.

Euprepis (part.), *Wagler*.

Each scale with several keels. Tail longish, rounded, without spines. Nostril in a single small shield. Limbs four, each with five toes. The palatal notch is placed far backwards.

This genus has nearly the same geographical distribution as *Eumeces*, and is also very rich in species. Those belonging to the East Indian fauna are less numerous, and may be distinguished as follows:—

I. Supranasal shield none: *Ateuchosaurus*, Gray.

Each scale with two keels *E. chinensis*, p. 78.

II. A pair of supranasal shields are present.

A. The whole of the lower eyelid is scaly: *Tiliqua*, Gray.

Each scale with three keels; opening of the ear not very small *E. rufescens*, p. 79.

Each scale with two keels *E. monticola*, p. 80.

Each scale with three keels; opening of the ear very small *E. olivaceus*, p. 80.

Each scale with from five to seven keels *E. macularius*, p. 81.

B. The lower eyelid with a transparent disk: *Euprepis*, Gray.

Each scale with six or seven keels *E. trilineatus*, p. 81.

EUPREPES CHINENSIS.

Ateuchosaurus chinensis, Gray, *Lizards*, p. 107.

Supranasal shield none, the prefrontal forming broad sutures with the rostral and vertical, the latter shield being very long; opening of the ear not fringed. Scales with two keels each, in twenty-six longitudinal and thirty-four transverse series. Preanal and subcaudal scales not enlarged. Limbs rather feeble; hind toes unequal in length, the third being one-fifth shorter than the fourth. Uniform brownish (in spirits).

Only one specimen is known of this Skink; it is the type, but in bad condition. It is 3 inches long, of which the tail takes rather more than one-half. China.

EUPREPES RUFESCENS. *The Common Indian Skink.* (Plate X. fig. B.)

Lacerta rufescens, Shaw, *Zool.* iii. p. 285.

Scincus multifasciatus, Kuhl, *Beitr.* p. 12.

Tiliqua rubriventris, Gray, *Ind. Zool.*, and *Ann. & Mag. Nat. Hist.* 1846, xvii. p. 430.

— *carinata*, Gray, *Zool. Journ.*

— *affinis*, Gray, *Ann. Nat. Hist.* ii. p. 289.

Euprepes sebae, Dum. & Bibr. *Erpét. gén.* v. p. 692.

Tiliqua rufescens, Gray, *Lizards*, p. 109.

Euprepes rufescens, Cantor, *Cat. Mal. Rept.* p. 46.

Plestrodon sikkimensis, Gray, *Ann. & Mag. Nat. Hist.* 1853, xii. p. 388.

A pair of supranasal shields; the prefrontal is generally separated from the rostral and vertical by the supranasals and postfrontals, but sometimes it slightly touches one of the median shields named. The fifth upper labial is below the orbit, and much longer than high. Opening of the ear with a few minute tubercles in front. Scales with three more or less obtuse keels each, in twenty-eight or thirty longitudinal, and in about thirty transverse series. Præanal shields not enlarged; subcaudals generally broadish. Limbs of moderate strength; the third hind toe is one-fourth shorter than the fourth.

The coloration varies:—

a. Specimens from Madras and from the Deccan have a very distinct yellowish band running from the superciliary along the upper part of the side of the neck, becoming indistinct on the trunk. The sides below the yellow band are dark brown. Upper parts brown, with a blackish streak running along each series of scales. Lower parts whitish. Specimens from Nepal are generally more darkly coloured.

b. Specimens from Ceylon have the yellowish bands less distinct than the former; their sides are sometimes nearly black, or blackish brown, without lighter spots. Dorsal streaks very indistinct.

c. There is no trace of a whitish band in a specimen from Afghanistan. Upper parts brownish, with scattered black dots; sides variegated with black, white, and brown. This specimen has only twenty-eight longitudinal series of scales.

d. Pinang, Siam, and the East Indian Archipelago are inhabited by three varieties: the first is provided with a light lateral streak, more or less distinct brownish dorsal streaks, and with scattered white, black-edged ocelli on the sides. The second of these varieties is nearly uniform brownish olive; sides in some sprinkled with blood-red. The third shows a large oblong blood-red (in spirits, white) lateral blotch, the remainder of the body being of uniform coloration; the posterior part of the sides of the body and the anterior of the tail of some specimens are provided with square sky-blue spots in the middle of some of the scales.

This is one of the most common and most widely spread Lizards of the East Indies; it occurs in almost every part of the continent as well as of the Archipelago, from Afghanistan to China and to the Philippine Islands; it is even said to inhabit the Sandwich Islands.

With regard to its altitudinal extent, it is not found beyond an elevation of 8000 feet*. Cantor says that it is "exceedingly numerous in the hills and valleys of the Malayan countries. They may be seen basking in the sun, in bamboo hedges, or on trees; and they fearlessly enter houses in pursuit of insects, in which they display great agility. The female deposits six to twelve yellowish-white, oval, cylindrical eggs, half an inch in length." I have seen examples from 14 to 16 inches long, the trunk measuring 6 inches. The view of the head (Plate X. fig. B) is taken from a Madras specimen.

Having the typical specimen of *Plestiodon sikkimensis* before me, I have been enabled to convince myself of its identity with *E. rufescens*.

Tiliqua trivittata (Gray, Ind. Zool. c. fig., and Jerd. Journ. As. Soc. Beng. xxii. p. 478) appears to be a variety of this species; it has a third, well-marked whitish vertebral band, besides the two others running along the sides of the back. Mr. Jerdon procured his specimens at Jalnat, where it is the common species.

EUPREPES MONTICOLA. (Plate X. fig. C.)

A pair of contiguous supranasal shields; postfrontals forming a broad suture together; vertical rather elongate, tapering behind. The fifth upper labial is below the orbit, and much longer than high; opening of the ear rather small, with lobules in front. Each scale with only two rather prominent keels; scales in thirty-four longitudinal and in thirty transverse series. Preanal scales not enlarged; subcaudals rather larger than the others. Limbs of moderate strength; the third hind toe is one-fifth shorter than the fourth.

Upper and lateral parts greenish olive, with a light band running along each side of the back; back with small black spots; some scales on the sides with a white, black-edged ocellus. A white longitudinal streak edged with black below the orbit. Lower parts greenish white.

This species is found in Sikkim, at an altitude of above 8000 feet, where it represents the *E. rufescens* of the lowlands, from which it may be distinguished by its scales, which have two keels only. An adult female specimen is $8\frac{1}{2}$ inches long, of which the tail takes 5.

EUPREPES OLIVACEUS. (Plate X. fig. D.)

Dasia olivacea, Gray, *Ann. & Mag. Nat. Hist.* ii. p. 331.

Euprepes Ernesti, Dum. & Bibr. *Expét. gén.* v. p. 696. Cantor, *Mal. Rept.* p. 47.

A pair of small supranasal shields; the single prefrontal forms a suture with the rostral,

* My former assertion that this species occurs at between 8000 and 10,000 feet in the Himalayas is incorrect, as the specimens on which that opinion was founded, on a more careful examination, prove to belong to a species closely allied to, but different from, *Euprepes rufescens* (Proc. Zool. Soc. 1860, p. 167).

and is somewhat produced behind, slightly or nearly touching the vertical. The fifth upper labial is below the orbit, and not much longer than high. Opening of the ear very small, nearly entirely covered by the scales. Scales with three or more very slight keels each, not denticulated behind, in twenty-eight or thirty longitudinal and in as many transverse series. Preanal scales not enlarged; subcaudals rather larger than the scales on the side of the tail. Limbs of moderate strength; the third hind toe is one-sixth shorter than the fourth.

Upper parts brownish, with about twelve narrow, irregular, black transverse streaks, each black scale having a white spot. A whitish band along each side of the root of the tail. Lower parts greenish olive.

Young: the upper parts of the trunk black, with numerous, rather irregular, silvery transverse bands; shields of the head edged with black, and a black line edged with silvery from the snout to the ear. Feet and toes rose-coloured. Tail brilliant scarlet; lower parts whitish.

This species is less numerous than *E. rufescens*; it has been found on the Malayan Peninsula and on Prince of Wales Island; a specimen in the Paris Museum is said to have been captured in Java. Our largest individual is nearly 9 inches long, of which the tail takes rather more than one-half. Cantor found eleven eggs in a female, similar to those of *E. rufescens*.

EUPREPES MACULARIUS.

Euprepes macularius, *Blyth, Journ. As. Soc. Beng.* xii. p. 652.

Mr. Blyth describes this species as follows:—

"Like *E. rufescens*, but the scales of the upper parts 5-7-carinate. Bronzed olive-green above, pale below; the hinder half of back and base of tail above marked with irregular reddish-brown spots, and a broad reddish-brown lateral streak continued from the ear to the middle of the tail, marked throughout with white, which tends to form continuous lines posteriorly. Terminal half of tail whitish." Length of specimen 5½ inches, of which the tail measures 3½ inches. *Hab.* Rungpore?

EUPREPES TRILINEATUS.

Euprepes trilineatus, *Gray, Ann. & Mag. Nat. Hist.* 1846, xvii. p. 430. *Jerdon, Journ. As. Soc. Beng.* xxii. p. 479.

A pair of very narrow supranasal shields; the single præfrontal touches the rostral as well as the vertical. The fifth upper labial is below the orbit, and much longer than high. Opening of the ear small, with two more or less elongate lobules in front. Lower eyelid with a transparent disk. Scales with six or seven strong keels each, in thirty longitudinal

and twenty-eight transverse series. Preanal scales not enlarged; subcaudals rather larger than the others. Limbs of moderate strength; the third hind toe is one-fourth shorter than the fourth.

Yellowish olive, with three yellowish-white longitudinal bands: the first commences on the crown of the head, is edged with black, and disappears on the middle of the back; another runs along the upper lip, passes the tympanum, and terminates at the loin; it is edged with black superiorly and with red inferiorly; the hinder part of the back dotted with yellow; limbs and tail rose-coloured.

This elegant species was discovered by Mr. Jerdon, who found it "only in sandy ground near the sea in the Carnatic, concealing itself in holes and fissures, and under shrubs. It attains to a length of 7 inches, of which the tail is nearly 4."

MABOUIA, *Fitzinger*.

Scales thin, smooth, polished, not keeled. Tail rather long, rounded, without any keels or spines. Nostrils in a single small shield. Limbs four, each with five toes. Palate with more or less distinct teeth, the palatal notch being placed on the level of the eye.

Only two or three species are found on the East Indian continent:—

Scales in 20 longitudinal series *M. quadrilineata*, p. 82.

Scales in 24 or 26 longitudinal series; opening of the ear not fringed *M. chinensis*, p. 83.

(*M. maculata*, Blyth, p. 84.)

(Scales in 26 longitudinal series; opening of the ear fringed . . . *M. aurata*, Schneid. From Persia.)

MABOUIA QUADRILINEATA. (Plate X. fig. E.)

Plestiodon quadrilineatus, Blyth, *Journ. As. Soc. Beng.* xxii. p. 652.

Eumeces quadrivirgatus, Hallow, *Proc. Acad. Nat. Sc. Philad.* 1860, p. 502.

Supranasal shields forming a suture together before the præfrontal; eyelid scaly; hind toes very unequal in length, the third being one-fourth shorter than the fourth.

Præfrontal broad, short, not in contact with the vertical, the postfrontals forming a suture together. Four superciliary shields; a pair of anterior occipitals. A small shield between the nasal and the first loreal; two loreals. Opening of the ear not denticulated. Twenty longitudinal series of scales round the trunk; thirty-three transverse series between the axils of the fore and hind legs. A pair of large anal shields; subcaudals broad. Limbs well

developed: the fore legs extend to the snout, the hind legs two-thirds up the sides towards the axil.

Upper parts black, with a pair of whitish lines along the back, the lines beginning from the nose and the superciliaries; no median white line; another line commences at the tympanum and runs along the middle of the side. Lower parts whitish.

Hongkong. Length 6 inches, head and trunk measuring $2\frac{1}{2}$.

MABOUIA CHINENSIS. *The Chinese Skink.* (Plate X. fig. F.)

Tiliqua chinensis, Gray, *Ann. Nat. Hist.* i. p. 289.

Plestiodon sinense, Dum. & Bibr. *Erpét. gén.* v. p. 704.

Tiliqua rufo-guttata, Cantor, *Ann. & Mag. Nat. Hist.* 1842, ix. p. 482.

Plestiodon chinensis, Gray, *Lizards*, p. 92.

Supranasal shields forming a suture together before the prefrontal; eyelid scaly; hind toes very unequal in length, the third being one-fourth or one-fifth shorter than the fourth.

Prefrontal small, not, or but slightly, in contact with the vertical, the postfrontals generally forming a suture together. Four superciliary shields; a pair of anterior occipitals. *No small shield between the nasal and first loreal*; two loreals. Front margin of the opening of the ear with a few tubercles, but without prominent denticulations. Twenty-four or twenty-six longitudinal series of scales round the trunk; from thirty-four to thirty-six transverse series between the axils of the fore and hind legs. A pair of large anal shields; subcaudals broad.

Limbs well developed: the fore legs extend to the snout, the hind legs halfway or more than halfway up towards the axil.

The coloration changes with age:—

Young specimens have the same coloration as *Plestiodon quinquelineatus* from North America and Japan: the upper parts are black or blackish brown, with five longitudinal lines: one along the vertebral line, terminating in a fork on the crown of the head; one along each superciliary margin and along the side of back and tail, and one through each tympanum along the middle of the side.

The *young* specimens of a *variety* are browner on the back, and the outer white band is absent; this is *Plestiodon pulcher*, Gray, *Lizards*, p. 92.

In *another young* specimen the outer white band is replaced by a series of rose-coloured spots.

With advancing age the ground-colour of the upper parts changes from black to brown or brownish olive, and the longitudinal bands become rather broader and dirty white, but always remain visible, especially that along the vertebral line. They were edged with black, and the black edges, instead of being continuous, are now changed into series of black dots. Old specimens have some irregular black spots along the sides, which are intermixed with red ones during life.

I have compared this species with specimens from Japan and North America, and it is of no small interest that the Japanese specimens are specifically identical with those from North America, both constantly differing from the Chinese ones in having an additional small shield between first loreal and nasal. They also have somewhat smaller scales than those from China. In other respects all these Lizards are extremely similar. I have examined numerous specimens from Ningpo, Chikiang, Canton, and from the islands of Formosa and Chusan (type of *Tyloqua rufoguttata*, Cantor). This species attains to a length of 12-14 inches, the head and trunk measuring 6. In Persia it is represented by *Scincus auratus* of Schneider, a species extending westwards to the north of Africa.

Figure F of Plate X. represents the head of a half-grown specimen from Ningpo, in which the postfrontals are more widely separate than is usual, the prefrontal being slightly in contact with the vertical.

MABOUIA MACULATA.

Lissonota maculata, Blyth, *Journ. As. Soc. Beng.* xxii. p. 653.

This species is apparently allied to *Mabouia chinensis*,—the genus *Lissonota* being founded on altogether insufficient characters.

"Lower eyelid scaly; supranasals (frontinasals) small. Subcaudals larger than those of the body; two large triangular anals. Greyish olive-green, with a double row of irregular dark spots along the nape and back, and a median line of the same along the tail. On each side a dark band is continued throughout, commencing at the nostrils; and beneath this is a narrow pale streak, then a narrow dark one, and, finally, a few dark spots on the sides of the throat and belly. Upper surface of the limbs variegated throughout. Lower parts greenish white. Head and body $1\frac{1}{2}$ inch; tail probably about the same, but the tip is wanting. Fore limbs $\frac{3}{4}$ inch; hind limbs $1\frac{1}{2}$ inch; distance apart of fore and hind limbs 1 inch. From Assam."

EUMECES, *Wiegmann*.

Scales thin, smooth, polished, not keeled. Tail more or less long, rounded, without any keels or spines. Nostril in a single small shield. Limbs four, each with five toes. Palate without any teeth, the palatal notch being placed far backwards, behind the level of the eye.

The species of this genus are very numerous and spread over nearly all the different countries between, or near, the tropics; the Indian species may be referred to the following subdivisions:—

I. Supranasal shields none.

A. A small round space on the lower eyelid is transparent, not covered with scales: *Mocoo*, Gray.

* Vent covered by a pair of large anals.

- Scales in 24 longitudinal series; ear not denticulated; a pair of black lines along the back *E. bilineatus*, p. 85.
 Scales in 26 longitudinal series; ear denticulated *E. himalayanus*, p. 86.
 Scales in 25 longitudinal series; ear not denticulated; uniform black *E. schlegelii*, p. 86.
 Scales in 28 longitudinal series; ear not denticulated *E. modestus*, p. 87.
 Scales in 34 longitudinal series; ear not denticulated *E. reevesii*, p. 87.
 Scales in 38 longitudinal series; ear denticulated *E. ladacensis*, p. 88.
 (** Anal shields similar to the abdominal *Mocoo formosa*, Blyth, p. 88.)

B. The whole of the lower eyelid is scaly; body and tail of moderate length: *Hinulia*, Gray.

- Scales in 38 longitudinal series *E. indicus*, p. 89.
 Scales in 26 longitudinal series *E. laprobanensis*, p. 89.

C. Lower eyelid entirely scaly; body and tail very elongate; limbs feeble: *Podophis*, Wgm.

- Scales in 26 longitudinal series *E. chalcides*, p. 90.

II. A pair of supranasal shields are present.

A. The third hind toe is distinctly shorter than the fourth: *Mabouya*, Gray.

- Scales in 30 longitudinal series *E. siamensis*, p. 91.

B. The third and fourth hind toes are equal, or nearly equal, in length: *Riopa*, Gray.

* Body of moderate length.

- Scales in 30 transverse series *E. bowringii*, p. 91.
 Scales in 56 transverse series; the lower eyelid is scaly *E. albo-punctatus*, p. 92.
 Scales in 50 transverse series; lower eyelid with a transparent disk *E. hardwickii*, p. 92.

** Body elongate.

- Scales in 79 transverse series; lower eyelid with a transparent disk *E. punctatus*, p. 93.
 Scales in 80 transverse series; lower eyelid scaly *E. isodactylus*, p. 93.

EUMECES BILINEATUS. *The Black-striped Skink.*

Mocoo bilineata, Gray, *Ann. & Mag. Nat. Hist.* 1846, xviii. p. 430. *Jerd. Journ. As. Soc. Beng.* xlii. p. 477.

Supranasal shield none; the lower eyelid is transparent.

The single prefrontal is in contact with the rostral as well as with the vertical. Four superciliary shields; a pair of anterior occipitals; front margin of the ear with a pair of tubercles, not denticulated. Twenty-four longitudinal series of scales round the trunk, forty-four transverse series between the axils of the fore and hind legs. Vent covered by a pair of large anals; subcaudals broad.

Limbs rather feeble: the fore legs extend nearly to the eye, the hind legs not quite halfway up towards the axil; the third hind toe is one-fifth shorter than the fourth.

Brownish olive above, greenish below. A broad brown or black band runs from the shoulder along the upper half of the side, enclosing below a whitish longitudinal line. A pair of black lines along the back, arising on the nape; these lines are brown or less distinct in half-grown specimens, and entirely absent in young ones.

Discovered by Jerdon under stones on the summit of the Nilgherries. Length 5 inches, the head and trunk measuring half of it.

EUMECES HIMALAYANUS. (Plate X. fig. H.)

Supranasal shield none; the lower eyelid is transparent.

The single præfrontal forms a suture with the rostral; præfrontal, postfrontals and vertical meet in a point. Four superciliary shields; a pair of anterior occipitals; front margin of the ear very distinctly denticulated. Twenty-six longitudinal series of scales round the trunk, forty-one transverse series between the axils of the fore and hind legs. Vent covered by a pair of large anals; subcaudals broad.

Limbs moderately developed: the fore legs extend to the eye, the hind legs more than halfway up towards the axil; the third hind toe is one-fifth shorter than the fourth.

Greenish olive above, with interrupted whitish lines and series of blackish dots; sides with a dark band, which has a narrow greenish-white edge above and a broad one below; the lower parts greenish, each scale with a darker margin.

Several specimens were procured by Messrs. v. Schlagintweit in the Himalayas, and are now in the British Museum: two from Kashmir, two from Garhwal, and one from Simla. The largest is 4 inches long, the tail measuring half.

Figure H of Plate X. represents the head of the largest example, of twice the natural size.

EUMECES SCHLEGELII.

Tiliqua schlegelii, *Günth. Proc. Zool. Soc.* 1860, p. 153. pl. 25. fig. C.

Supranasal shield none; the lower eyelid is transparent.

The single præfrontal forms a suture with the rostral as well as with the vertical. Front margin of the ear without any tubercles or lobules. Scales striated, but not keeled, in twenty-

five longitudinal and in thirty-five transverse series. Vent covered by four shields, the middle pair being considerably the larger; subcaudals broad.

Limbs moderately developed; the fore legs extend somewhat beyond the eye, the hind legs more than halfway up towards the axil; the third hind toe is one-fifth shorter than the fourth.

The upper parts are uniform black, the lower ones blackish.

A single specimen, nearly $4\frac{1}{2}$ inches long, has been found by Messrs. v. Schlagintweit in Sikkim, at an altitude of 8930 feet.

EUMECES MODESTUS. (Plate X. fig. G.)

Supranasal shield none; the lower eyelid is transparent.

The single præfrontal forms a suture with the rostral; præfrontal, postfrontals and vertical meet in a point, or the præfrontal is slightly in contact with the vertical. Four superciliary shields; a pair of anterior occipitals. Opening of the ear not denticulated. Twenty-eight longitudinal series of scales round the trunk; forty transverse series between the axils of the fore and hind legs. The middle pair of shields covering the vent are much larger than the lateral ones; subcaudals broadish.

Limbs rather feeble: the fore legs extend to, or nearly to, the eye, the hind legs halfway up towards the axil; the third hind toe is one-sixth shorter than the fourth.

Yellowish olive above, with indistinct and interrupted lines of black dots; upper part of the sides with an undulated brown band; lower parts whitish with some olive dots.

The two specimens in the British Museum are 4 inches long, the head and trunk measuring $1\frac{1}{2}$ inch; they are from Ningpo.

Figure G of Plate X. represents the head, of twice the natural size.

EUMECES REEVESII. (Plate X. fig. K.)

Tiliqua reevesii, Gray, in *Ann. Nat. Hist.* ii. p. 292.

Hinulia reevesii, Gray, *Lizards*, p. 76.

Supranasal shield none; the lower eyelid is transparent.

The single præfrontal forms a suture with the rostral, but is separated from the vertical by the two postfrontals, which are broadly joined together. Four superciliary shields; a pair

of anterior occipitals. Opening of the ear not denticulated. Thirty-four longitudinal series of scales round the trunk, forty-six transverse series between the axils of the fore and hind legs. The middle pair of shields covering the vent are much larger than the lateral ones, whilst the shields along the middle of the lower side of the tail are not much larger than the rest.

Limbs rather feeble: the fore legs extend to the eye, the hind legs to rather more than halfway up towards the axil; the third hind toe is one-fifth shorter than the fourth.

Brownish above, yellowish below, a dark-brown band running along the upper part of the side.

The typical specimen (the only one known*) is apparently young, $4\frac{1}{2}$ inches long, the head and trunk measuring $1\frac{1}{2}$ inch. It is a native of China.

Figure K of Plate X. represents the head, of twice the natural size.

EUMECES LADACENSIS. (Plate X. fig. I.)

Supranasal shield none; the lower eyelid is transparent.

The single præfrontal forms a suture with the rostral and with the vertical. Four superciliary shields. A pair of anterior occipitals. Thirty-eight longitudinal series of scales round the trunk, fifty-six transverse series between the axils of the fore and hind legs. Vent covered with a pair of large anals; subcaudals broad. Opening of the ear denticulated in front.

Limbs well developed: the fore legs extend to the snout, the hind legs more than halfway up towards the axil; the third hind toe is one-fifth shorter than the fourth.

Greenish above, with longitudinal series of black dots; sides with an obscure band; lower parts greenish white.

A single specimen was brought home by Messrs. v. Schlagintweit from Ladak (Tibet), and is now in the British Museum. Head and trunk 2 inches long, the greater part of the tail being broken off.

Figure I of Plate X. represents the head, of twice the natural size.

Mocoo formosa, Blyth (Jouru. As. Soc. Beng. xxii. 1854, p. 651), is a species unknown to me. As Blyth refers this Lizard to Gray's genus *Mocoo*, we may presume that it has no supranasal, and that the

* We doubt whether Australian specimens (*Lygosoma quoyii*, D. & B.) are specifically identical with *Eumeces reevesii*.

lower eyelid has a transparent disk. It is described as follows:—"Scales hexagonal, in six dorsal series; anal similar to the abdominal. Form robust. Vertical broadest to the front, and rounded posteriorly. Anterior occipitals distinct, but unsymmetrically divided. Colour olive-green, with black lateral and pale superlateral bands, the former much speckled with white, and the latter showing a series of black spots. Between the pale superlateral streaks are five narrow black lines along the nape and body, variegated with angular greenish-white spots. Limbs minutely pencilled with black, and spots or streaks of the same upon the head. Under parts greenish plumbeous. Seven inches long, of which the tail measures half. Procured at Mirzapore. Others from Wuzerabad are smaller and less marked with black, which does not form continuous lines along the back, but variegated scales are throughout scattered, and there are some black markings on the head."

EUMECES INDICUS.

? *Lygosoma dussumierii*, *Dum. & Bibr. Expft. gén.* v. p. 725.

Hinulia indica, *Gray, Ann. & Mag. Nat. Hist.* 1853, xii. p. 388.

?? *Mocosa sikimensis*, *Blyth, Journ. As. Soc. Beng.* xxii. 1854, p. 652.

Supranasal shield none; the lower eyelid is scaly.

The single prefrontal forms a suture with the rostral and with the vertical. Four superciliary shields; anterior pair of occipitals not united. Two loreals and one anteorbital. Opening of the ear not denticulated in front. Thirty-eight longitudinal series of scales round the trunk, eight of which run along the back. Forty-six transverse series of scales between the axils of the fore and hind legs. Vent covered with a pair of large anals; tail with a series of enlarged subcandals.

Limbs well developed: the fore legs extend to the snout, the hind legs nearly to the axil; the third hind toe is one-fourth shorter than the fourth.

Brownish olive above, with a few scattered black spots; sides with a broad, ill-defined, blackish-brown band, generally with irregular whitish edges; the band itself is spotted with white, and, becoming paler, it is continued on along the sides of the tail. Lower parts whitish. Some specimens are nearly uniform brownish, showing faint traces of the dark lateral band.

This species is common in Sikkim; one specimen, purchased of Mr. H. Cuming, is said to come from Ningpo in China. From 8 to 10 inches long, of which the trunk takes 3 or $3\frac{1}{2}$ inches.

EUMECES TAPROBANENSIS. (Plate XIII. fig. B.)

Eumeces taprobanensis, *Kelaart, Prodr. Faun. Zeyl., Rept.* p. 21.

Lygosoma fallax, *Peters, Monatsber. Berl. Acad.* 1860, p. 181.

Supranasal shield none; the lower eyelid is scaly.

The single præfrontal forms a suture with the rostral; præfrontal, postfrontals, and vertical meet in a point. Four superciliary shields; the anterior occipitals are sometimes united into one shield, sometimes divided into three pieces, but generally in a pair; two loreals, one anteorbital. Opening of the ear with two very small denticulations in front. Twenty-six longitudinal series of scales round the trunk; thirty-six transverse series of scales between the axils of the fore and hind legs. The middle pair of shields covering the vent are scarcely larger than the lateral ones; middle subcaudals slightly enlarged.

Limbs rather short: the fore legs extend to the eye, the hind legs rather more than half-way up towards the axil; the third hind toe is one-sixth shorter than the fourth.

Brown above, with a light band running from above the tympanum along the side of the back; sides blackish or black, this colour forming sometimes a band accompanying the light one; the lower parts yellowish. Some individuals have the sides of the head and the throat dark greenish blue with numerous white dots; others are uniform brownish.

Ceylon. One specimen, purchased of Mr. H. Cuming, is said to be from Ningpo in China. Kelaart says that it is found at Newera Ellia. The British Museum possesses one of the typical specimens and several others. Total length $5\frac{1}{2}$ inches; head and trunk 2 inches.

EUMECES CHALCIDES.

Lacerta chalcides, L. *Syst. Nat.* i. p. 369.

— *serpens*, Bloch, in *Bescheft. Berl. Gesellsch. naturf. Freund.* ii. p. 28. tab. 2.

Scincus brachypus, Schneid. *Hist. Amph.* p. 192.

Lygosoma serpens, Gray, *Zool. Journ.* iii. p. 228.

— *aurata*, Gray, in *Griff. Anim. Kingd.* ix. p. 72.

— *brachypoda*, Dum. & Bibr. *Erpét. gén.* v. p. 721.

Podophis chalcides, Gray, *Lizards*, p. 88.

Lygosoma chalcides, Cantor, *Catal.* p. 49.

Body and tail very elongate, with very short limbs, each with five minute toes. Supranasal none; the lower eyelid is scaly.

The single præfrontal forms a suture with the rostral and with the vertical; anterior occipitals confluent into one shield. Opening of the ear very small. Twenty-six longitudinal series of scales round the trunk, from ninety to a hundred transverse series between the axils of the fore and hind limbs. The middle anal shields a little larger than the lateral; subcaudals small. Greyish olive, with brown lines along the series of scales.

The longest specimen I have seen measures 8 inches, head and trunk taking one-half of it; it is not thicker than a goose-quill. The species is found in Java, at Pinang, in Siam, and near Hongkong.

EUMECES SIAMENSIS.

Supranasal shields meeting before the prefrontal; the lower eyelid is transparent. Hind toes very unequal in length, the third being one-fifth shorter than the fourth.

Prefrontal, postfrontals, and vertical meet in a point. Four superciliary shields; a pair of anterior occipitals; opening of the ear without denticulation. Thirty longitudinal series of scales round the trunk, thirty-two transverse series between the axils of the fore and hind legs. Anal shields subequal in size; subcaudals broadish.

Limbs well developed: the fore legs extend to the eye, the hind legs not quite to the axil.

Uniform greenish olive above, whitish below; a well-defined deep-black band runs from the snout along the upper part of the sides; it is not margined with white.

This species is closely allied to the West Indian *Mabouia agilis*; we have seen only one specimen, sent by Mouhot from Siam for the British Museum. It is 6 inches long, head and trunk measuring 2 inches.

EUMECES BOWRINGII.

The supranasal shields touch each other, separating the rostral from the prefrontal, which forms a broad suture with the vertical. The lower eyelid is scaly. Toes rather short, the third hind toe being but very little shorter than the fourth. A pair of anterior occipitals. Twenty-eight longitudinal series of scales round the trunk, thirty transverse series between the axils of the fore and hind legs. The middle anal shields are scarcely larger than the lateral; no broad subcaudals.

Opening of the ear not denticulated. Limbs rather feeble; the fore legs do not extend on to the eye, and the hind legs scarcely extend halfway up the sides towards the axil.

Brownish olive above, with an indistinct dark line along each series of scales; a brown band along each side of the back; sides with interrupted series of dark-brown dots.

A single specimen, from Hongkong, was presented to the British Museum by Sir J. Bowring; it is $3\frac{1}{2}$ inches long, head and trunk measuring $1\frac{1}{2}$ inch.

EUMECES ALBOPUNCTATUS. *The White-dotted Skink.*

Riopa albo-punctata, Gray, *Ann. & Mag. Nat. Hist.* xviii. 1846, p. 430. *Jerd. Journ. As. Soc. Beng.* xxii. p. 477.

Eumeces punctatus, var., Cantor, *Mal. Rept.* p. 45.

Supranasal shields in contact with each other. Limbs feeble, with very short toes, the third hind toe being but little shorter than the fourth. The lower eyelid is scaly.

The single prefrontal is in contact with the vertical. Four superciliary shields; a pair of anterior occipitals; front margin of the ear tubercular, not denticulated. Twenty-eight longitudinal series of scales round the trunk, fifty-six transverse series between the axils of the fore and hind legs. Middle anal shields somewhat larger than the lateral ones; no broad subcaudals.

The fore legs do not extend to the eye; the length of the hind legs is two-sevenths of that of the trunk.

Back uniform olive-coloured, or with a line of very small dots along each series of scales. Anterior part of the sides blackish brown, with numerous small white spots. Uniform whitish below.

The largest specimen I have seen is $4\frac{1}{2}$ inches long, the head and trunk measuring $2\frac{1}{2}$ inches. This species was discovered by Jerdon in the Nellore district: Blyth has received it from Mergui. Cantor has confounded it with *E. punctatus* and *E. hardwickii*, as I have convinced myself by the examination of specimens named and sent by him; he says that it is numerous in the Malayan countries.

EUMECES HARDWICKII. *The White-streaked Skink.*

Riopa hardwickii, Gray, *Lizards*, p. 96. *Jerd. Journ. As. Soc. Beng.* xxii. p. 478.

Mabouya elegans, Gray, *Lizards*, p. 95.

Supranasal shields in contact with each other. Limbs and toes feeble, the third hind toe being but little shorter than the fourth. The lower eyelid with a transparent disk.

The single prefrontal forms a suture with the vertical. Four superciliary shields; a pair of anterior occipitals. Front margin of the opening of the ear not denticulated. Twenty-six longitudinal series of scales round the trunk, fifty transverse series between the axils of the fore and hind legs. Middle anal shields scarcely larger than the lateral ones; no broad subcaudals.

The fore legs do not extend to the eye; the length of the hind legs is two-fifths of that of the trunk.

Back brownish, with four series of black dots, and with a yellowish-white band arising from the nose and from the superciliaries; a series of black dots along each edge of these bands; each scale on the sides with a black dot, the upper dots being the largest and confluent. Lower parts uniform white.

This species attains to the length of 4 or 5 inches, the head and trunk measuring 2 inches. Jerdon mentions a specimen 9 inches long, and says that it is common in the Carnatic. According to Blyth it is also found in Ceylon. The British Museum possesses a specimen from Patna, and others from the Nilgherries.

EUMECES PUNCTATUS. *The Dotted Skink.*

Lacerta punctata, *L. Syst. Nat.* p. 369.

— *interpunctata*, *Gm. L. Syst. Nat.* i. p. 1075.

Seps scinoides, *Cuv. Règne Anim.*

Eumeces punctatus, *Wieg. Herp. Mex.* p. 36.

Riopa punctata, *Gray, Lizards*, p. 96.

Supranasal shields in contact with each other. Limbs feeble, with very short toes, the third hind toe being but little shorter than the fourth. The lower eyelid is transparent.

The single præfrontal forms a suture with the vertical. Four superciliary shields; a pair of anterior occipitals; front margin of the ear tubercular, not denticulated. Twenty-four longitudinal series of scales round the trunk, seventy-nine transverse series between the axils of the fore and hind legs. Middle anal shields not enlarged; no broad subcaudals.

The fore legs extend to, or somewhat beyond, the ear; the length of the hind legs is two-ninths of that of the trunk.

Each scale with a black dot, the dots forming longitudinal series; they are largest on the back of the tail, and sometimes entirely absent on the belly. The outer series of scales on each side of the back has very small dots.

This species is found on the coasts of Malabar and Coromandel, in the neighbourhood of Madras, and in the Deccan. Kelaart (*Prodr. Faun. Zeylan.* p. 151) mentions it as inhabiting Ceylon, but this requires confirmation. It attains to a length of 12 inches, the head and trunk measuring 5 inches.

EUMECES ISODACTYLUS. *The Short-toed Skink.* (Plate XIII. fig. A.)

Supranasal shields separated by the rostral. Limbs feeble, with very short toes, the third and fourth hind toes being equal in length. The lower eyelid is scaly.

The single prefrontal touches the rostral, and forms a broad suture with the vertical. Four superciliary shields. Anterior occipitals united (this may be an individual peculiarity, as a part of the supranasal also is confluent with the nasal). Opening of the ear a very narrow and short oblique slit. Thirty-four longitudinal series of scales round the trunk, eighty transverse series between the axils of the fore and hind legs. Vent covered with about six subequal anals; no broad subcaudals.

Limbs feeble; the fore legs extend to the ear; the length of the hind legs is two-elevenths of that of the trunk; the four outer hind toes are subequal in length.

Olive, the upper parts with irregular, confluent, blackish spots; each transverse series of the scales on the sides with a narrow blackish edge; belly with numerous blackish dots irregularly arranged.

This species is allied to *Senira bicolor*, Gray, from the Philippine Islands, which, however, has considerably larger scales (twenty-six round the trunk). A single specimen has been sent from Gamboja by Mouhot; it is 8 inches long, the tail measuring half of it.

HAGRIA, *Gray*.

Scales smooth, not striated or keeled. Body and tail elongate, rounded, tapering, without any keels or spines. Nostrils lateral, in a single shield. Limbs four, short, feeble, far apart; the anterior with five toes, the posterior with four. Palate without teeth, slightly notched behind.

Only one species is known.

HAGRIA VOSEMERII.

Hagria vosemerii, Gray, *Ann. Nat. Hist.* ii. p. 333.

Campsodactylus lamarrei, Dum. & Bibr. *Expét. gén.* v. p. 762.

Snout conical; a pair of contiguous supranasal shields; the single prefrontal forms a suture with the vertical. Superciliaries four on each side. Opening of the ear not fringed. Toes of unequal length, clawed. Scales in twenty-two longitudinal series; preanal scales not enlarged. Body and tail with alternate brown and yellow lines, corresponding to the series of scales. Head brown.

Bengal.

CHIAMELA, *Gray.*

Scales smooth, not striated or keeled. Body and tail elongate, tapering, without any keels or spines. Nostrils lateral, in a single shield. Limbs four, short, feeble, far apart, each with four clawed toes.

Only one species is known.

CHIAMELA LINEATA.

Chiamela lineata, *Gray, Ann. Nat. Hist.* ii. p. 333.

Two band-like, transverse, contiguous supranasals. Opening of the ear small, nearly hidden under the scales. The first hind toe very short, the second and third gradually longer; the third and fourth equal and longest. Brownish, with black lines corresponding to the series of scales.

I have seen only a very small specimen of this Slow-worm-like Lizard; it is not known in what part of the East Indies it is found.

ANGUIS MELANOSTICTA.—Russell (*Ind. Serp.* i. tab. 42) figures a small Blindworm-like Reptile which has not been recognized by later naturalists. The figure does not give sufficient characteristic details to enable us to determine the genus to which this reptile belongs, or even to ascertain whether it is a Lizard or a Snake. Merrem names it *Tortrix melanosticta*; Gray refers it provisionally to *Anguis*. The specimen figured was obtained on the coast of Coromandel, and is described as follows:—

“Ventral shields 151, subcaudals 120. The head not broader than the neck, ovate, obtuse, convex, covered with laminae of unusual shapes. The first pair small, perforated by the nostrils; then one lamina, transverse, resembling a flask with a short neck; the next between the eyes, broad-oval; the next sagittate; and, behind all, two, long-oval, lying obliquely on the occiput. The mouth not wide; the jaws unequal. The teeth small, numerous, reflex; a marginal and two palatal rows in the upper jaw. The eyes lateral, small, suboval, not prominent. The nostrils close to the point of the rostrum, very small. The trunk cylindric, nearly of equal thickness from the head to the end of the tail. The scales small, orbicular, imbricate, and each having a black dot: eight or ten parallel dotted lines are formed, running from the head to the end of the tail. The length $10\frac{1}{2}$ inches; thickness about that of a swan-quill. The tail round, smooth, hardly tapering, point blunt; measures $4\frac{1}{2}$ inches. The colour a reddish brown; but part of the tail is cineritious, or of a pale blue; the abdominal and subcaudal squamæ are of a glossy white, without dots. It quickly buries itself in the sand when pursued.”

FAMILY OF ACONTIADS—*ACONTIADIDÆ*.

Head covered with shields which are symmetrically arranged. Tongue free, exsertile, nicked at the end. Scales on the back rounded, quincuncial, imbricate; those on the belly similar to those on the back and on the sides. No fold across the throat or along the side; no femoral or inguinal pores. Tail long, rounded, fragile. Eye and lower eyelid well developed. Nostrils in the enlarged rostral plate, with a longitudinal slit behind. Limbs rudimentary or absent.

The form of the body of these Lizards much resembles that of our common Blind-worm; and they appear to have very similar habits. Their limbs, if present, are so rudimentary that they can give but little assistance in locomotion.

ACONTIAS, Cuvier.

Legs entirely absent.

The type of this genus is a South African species; Kelaart, however, has discovered in Ceylon a lizard which appears to belong to it.

ACONTIAS LAYARDI.

Acontias (?) *layardi*, *Kelaart, Prodr. Faun. Zeyl.* ii. p. 12.

"Light olive and spotted longitudinally with brown spots, paler beneath. Length of young 4 inches. Soil of the Cinnamon Gardens of Colombo."

NESSIA.

Nessia et Evesia, *Gray.*

Four rudimentary legs. Rostral shield large, subconical, depressed.

These small Lizards are evidently burrowing reptiles, approaching the Rhinophides in habit and mode of life. They appear to be confined to the island of Ceylon, whilst the latter extend over some parts of the neighbouring continent also. The two species known are so

similar to each other, that I do not venture to separate them into two different genera. No previous observer has had an opportunity of comparing both species.

Feet divided into three minute toes *N. burtonii*, p. 97.

Feet undivided *N. monodactyla*, p. 97.

NESSIA BURTONII.

Nessia burtonii, Gray, *Ann. & Mag. Nat. Hist.* ii. p. 336. *Kelaart, Prodr. Faun. Zeyl.* ii. p. 12.

Body and tail elongate, cylindrical, as in a Blindworm. Tail generally shorter than the body, from its being constantly broken off and reproduced. Rostral shield large, protruding, depressed, pierced laterally by the nostril, behind which is a longitudinal groove. Frontals confluent into one large shield; vertical large, subquadrangular, concave laterally to receive the supraorbitals, which are four in number; three occipital shields, the middle of which is the largest, triangular. A very long loreal shield, below which is the first labial, which is similar in form and length to the loreal; several other imbricate, scale-like labials behind. Trunk surrounded by twenty-five longitudinal and by eighty-four transverse series of smooth equal scales; præanals and subcaudals scarcely larger than the others. Eye small; opening of the ear not visible. Feet very short and feeble; the hind feet are about as long as the snout; each terminates in three minute toes with short claws. Colour brownish above, whitish below, each scale with a darker margin.

This species grows to a length of 5 inches, the head and trunk measuring 3. Kelaart obtained specimens from Kaduganava and from Allagalla (3000 feet), and was informed that it is common at Ambegamma.

NESSIA MONODACTYLA.

Evesia monodactyla, Gray, *l. c.*

— *bellii*, Dum. & Bibr. v. p. 783.

Tetrapodos smithii, Jan, in *Wieg. Arch.* 1860, p. 69. tab. 2. fig. 4.

This species is so similar to *N. burtonii*, that we need not give a lengthened description or figure of it; it may be readily recognized by the following characters:—Trunk surrounded by twenty-two or twenty-five longitudinal and by 102 transverse series of scales. Opening of the ear minute, but distinct. Feet very short and feeble, the hind feet about half as long as the snout, not terminating in toes.

The proportions of the body and tail are the same as in *N. burtonii*.

FAMILY OF SAND LIZARDS—*SEPSIDÆ*.

This family differs from those of the Skinks and of the Acontiads by the nostrils being in the front edge of a small shield, in a notch at the hinder side of the rostral.

The species are African, extending over the warmer parts of Western Asia. One species reaches to Afghanistan, and was first described by Mr. Blyth.

SPHENOCEPHALUS, *Blyth*.

Limbs four, rudimentary, each with three toes. Ears invisible.

SPHENOCEPHALUS TRIDACTYLUS.

Sphenocephalus tridactylus, *Blyth, Journ. As. Soc. Beng.* xxii. p. 654.

"A Sepsoid form affined to *Sphenops*, but with more slender and elongate shape, and the limbs placed more distinctly apart; the anterior minute, and fitting into a groove; the posterior as large as in *Sphenops*, and each having but three toes, of which the innermost and next are subequal, and the outer much shorter. Form slender, two-thirds cylindrical, quite flat, and laterally angulated beneath as far as the vent; the body and tail covered with small, smooth, lustrous, hexagonal scales, with a median row of broader subcaudals. Tongue broad, triangular, its cleft scarcely perceptible; the incision of the palate small. Teeth very minute. Eyes minute, with semitransparent lower lid. No external trace of ear. Nostrils terminal, placed in the anterior margin of the nasals, contiguous to the front of each supraanasal* and the rostral; rostral equilaterally triangular; the single prefrontal broad, septangular, with apex to the front; postfrontals subtriangular, a little elongated; vertical obtusely subtriangular; occipital inequilaterally pentangular, with obtuse posterior base, single, and as large as the vertical. A large subquadri-lateral plate under the eye, and three small transversely narrow plates in front of it, and posterior to the nasal plate. A large diamond plate on centre of chin, emarginate anteriorly to admit a small roundish plate which is bordered by the anterior laterals. Very pale brown. Total length 6 inches, of which the tail is 2 inches, and distance apart of the fore and hind limbs half an inch (?). Length of fore limb $\frac{1}{4}$ th of an inch, of hind $\frac{3}{8}$ ths of an inch. From Afghanistan."

* I have changed the terms applied by Mr. Blyth to the shields of the head, for those used by myself.

FAMILY OF GECKOS—*GECKOTIDÆ*.

Head broad, triangular, more or less depressed; upper parts granular or tubercular; belly covered with small, rhombic, imbricate scales. Tongue rather thick and short, its basal portion being attached to the gullet. Eyelids generally rudimentary, and not connivent; pupil generally erect. Toes generally with an adhesive apparatus.

The typical forms of this family may be recognized at first sight: the head is broad and depressed, with large eyes; the body is of moderate breadth; the tail thick at the base, tapering, generally somewhat deformed, as it easily breaks off and is as easily renewed. The limbs are stout, of moderate length, with at least four of the toes well developed.

They are found in almost every part between and near the tropics, frequenting houses, rocks, and trees; and some of the species are so numerous around and within human dwellings, that they are most familiar objects to the inhabitants. All the Indian species, with the exception of *Eublepharis*, are able to run up and along the surface of a wall or of any other perpendicular object: for this purpose the lower surface of their toes is provided with a series of moveable plates or disks, by the aid of which they adhere to the surface over which they pass. These plates occupy either the whole length of the toes, or only their basal half, or they are most developed towards or at the extremities. All the Indian species, with the exception of a species referred by Blyth to the genus *Phelsuma*, are also provided with claws; and in some of the genera which inhabit forests rather than houses, the adhesive disks are less developed than the claws, the latter being of greater use for walking up the rough bark of a tree than the former.

The next important feature in the organization of the Geckos is the eye. This organ is rather large, surrounded by a circular rudimentary eyelid, except in *Eublepharis*, which has two distinct connivent eyelids. The pupil is generally contracted in a vertical direction, shaped like two rhombs placed with the angles towards each other. This structure of the eye is in accordance with their nocturnal habits; a few species, however, are diurnal, and have round pupils. The iris is bright-coloured.

No Gecko has imbricate scales on the back*; the head is finely granular, and generally the back also, but frequently larger or smaller tubercles are intermixed with the granulations in greater or less number. The covering of the tail resembles that of the back; it is generally verticillated, and breaks off so readily that the slightest touch, or even fear, will make some shake off their tails, as if desirous to get rid of such an incumbrance. When the

* Mr. Jerdon describes a scaled Gecko, *Homonota fasciata* (Journ. As. Soc. Beng. xxii. p. 468); but the descriptions of reptiles given by that gentleman are so obscure (partly because he rarely hit upon the proper generic name, and partly because the few words serving for a description generally contain the most trivial characters), that in this case also we are entirely at a loss to imagine what sort of lizard is the type of this *Homonota fasciata*.

tail is reproduced, it is rounder, thicker, sometimes bifid or trifid; and if it originally had tubercles or a series of enlarged subcaudals, these tubercles and shields are sometimes absent, or at first much less developed. The reproduction of the tail is so quick a process, that it is certainly often renewed during the lifetime of the animal.

Larger shields or scales are only present round the margin of the jaws, and sometimes in the preanal region. The rostral shield is one of the largest, and either contiguous to the nostrils or separated only by a very small shield. The larger scales in the preanal region are generally in connexion with the pores which are found in the greater part of the species, either along the inner side of the femur, or across the preanal region. *The presence or absence of these pores is not a specific character, as where present in a species they are peculiar to the male sex only.*

There is a great tendency towards an enlargement of the surface of the body by expansions of the skin: it is very loose, and forms a slight fold along the sides of the body, in numerous Indian Geckos; others have a more or less developed web between the toes; *Peripia* and *Nycteridium* have a broad fold in the ham, which prevents the leg from being stretched in a straight line. The lateral fold is more developed in *Nycteridium* than in other Geckos; and, finally, *Ptychozoon* shows such a development of these cutaneous expansions that they become of essential assistance in locomotion, as will be seen in the description of that genus.

I have observed in many Geckos a calcareous mass on each side of the neck, at the place where the parotoid gland of the Toads is situated. This secretion may be entirely absent in some individuals, forming in others of the same species only a thin layer of soft consistence, whilst in others, again, it is accumulated in round and hard masses. No pores in the skin are visible externally.

The Geckos do not attain to any considerable size, the largest species being from 10 to 14 inches long. They are carnivorous animals, destroying insects, moths, and even the younger and weaker members of their own species; Geckos have even been seen devouring their own tail. They are of fierce habits, fighting between themselves, particularly when one has caught a larger insect than he is able to swallow at once. They make a spring at their victim. Their greediness has developed some intellectual faculties in the House Geckos: accustomed to be fed at a certain time with rice, &c., these little lizards will punctually make their appearance, and fearlessly take the proffered food*.

Another peculiarity of the Geckos is that they are endowed with voice: in *Gecko guttatus* it is a shrill cry, sounding like "To-kee"; in *Gecko monarchus* it resembles the monosyllable "Tok," repeated six or eight times with increased celerity; in *Hemidactylus frenatus* it is a sharp quick call, like "Chic, chic, chit," &c. They have several vernacular names in imitation of these sounds—as *Too-kai*, *To-kee*, *Cheecha*, *Gokee*, *Koko* (*Gecko*).

The following genera are known to exist in British India:—

* Teunent's Nat. Hist. Ceylon, p. 282.

A. *Eyelids rudimentary, circular.*

* *All the phalanges but the last with transverse plates below.*

- One series of undivided plates below each toe; trunk without cutaneous appendage *Gecko*, p. 101.
 One series of undivided plates below each toe; trunk with a wing-like expansion on each side *Ptychozoon*, p. 105.
 Two series of plates below the toes; claws 5/5; trunk without cutaneous appendage *Hemidactylus*, p. 106.
 Two series of plates below the toes; thumb and inner toe without claw or ungual phalanx *Peripia*, p. 110.
 Two series of plates below the toes; trunk with a cutaneous expansion on each side *Nycteridium*, p. 111.

** *Toes with the base slender and with the extremity dilated, below provided with undivided plates; claws none.*

- Fingers and toes rather elongate *Phelsuma*, p. 112.

*** *Basal portion of the toes depressed and plated below, the two outer phalanges being compressed and slender; no dorsal crest.*

- Claws 5/5, free *Gymnodactylus*, p. 112.
 Claws 5/5, hidden in a sheath *Pentadactylus*, p. 117.

**** *Toes not dilated; a rudimentary dorsal crest.*

- No femoral pores *Puellula*, p. 118.

B. *Eyelids well developed, connivent.*

- Toes cylindrical *Eublepharis*, p. 119.

GECKO, *Gray.*

Fingers and toes dilated in their whole length, with a series of undivided, imbricate, transverse plates below; only the short terminal joint is more or less compressed; four claws to each foot. Sides of the trunk without cutaneous appendage.

The species of this genus are confined to the Old World; the following are found in British India:—

* Back granular, with larger tubercles.

- Tubercles in about twelve longitudinal series; front chin-shields not longer than the first lower labial; body light-spotted *G. guttatus*, p. 102.
 Tubercles in ten longitudinal series; front chin-shields longer than the first lower labial; body dark-spotted *G. stenor*, p. 102.
 Tubercles very small; body with white cross bands *G. smithii*, p. 103.
 Tubercles numerous; front chin-shields much longer than the first lower labial; pairs of brown spots along the vertebral line *G. monarchus*, p. 103.

- Tubercles numerous; front chin-shields not longer than the first lower labial; back marbled with brown *G. japonicus*, p. 103.
 Tubercles very small, in six or eight rather irregular series; chin-shields shorter than the first lower labial *G. swinhonis*, p. 104.
 ** Back uniformly granular *G. subpalmatus*, p. 104.

GECKO GUTTATUS.

- Lacerta gecko*, *L. Syst. Nat.* i. p. 365.
 ——— *terres* et *G. verticillatus*, *Laur.* p. 44.
 ——— *guttatus*, *Daud.* iv. p. 122. tab. 49.
 ——— *verus*, *Merr. Amph.* p. 42. *Gray, Lizards*, p. 160.
 ——— *annulatus*, *Kuhl, Beitr. Zool.* p. 132.
Platydictylus guttatus, *Dum. & Bibr. Erpét. gén.* iii. p. 328.
Gecko reevesii, *Gray, Lizards*, p. 161.

Back covered with small flat granulations, and with about twelve longitudinal series of rounded conical tubercles; scales of the middle of the belly in about thirty-eight longitudinal series; præanal pores about twenty-four, in a slightly angular series; fourteen upper and eleven lower labials; the front pair of chin-shields are not longer than the first lower labial. Head depressed, triangular, not much longer than broad. Tail without large subcaudals, with transverse series of tubercles across its back. Above ash-coloured, with numerous round pale-orange spots.

This is one of the most common species in British India, in Siam, Cochinchina, and Southern China; it is found on numerous islands of the Archipelago, but appears to be entirely absent in Ceylon; it frequents houses, and attains to a length of 10–12 inches.

GECKO STENTOR. (Plate XI. fig. A.)

Platydictylus stentor, *Cantor, Catal. Mal. Rept.* p. 18.

Back covered with small flat granulations and with ten longitudinal series of mamilliform tubercles; scales of the middle of the belly in about thirty-four longitudinal series; præanal pores thirteen (all together), in a slightly angular series. Nostril separated from the rostral plate by a pair of small shields; thirteen upper and lower labials; the front pair of chin-shields are longer than the first lower labial. Head depressed, triangular, much longer than broad. Tail with a double series of enlarged subcaudals. Above light bluish grey, with numerous irregular blackish spots, on the vertex an angular mark like an inverted V, and on the neck short oblique lateral bands.

The typical specimen, 16 inches long, and obtained from the villa on the Pentland Hills at Pinang, is the only one known to have been found; it is in the British Museum. The species, therefore, appears to be very scarce.

GECKO SMITHII.

Gecko smithii, Gray, *Zool. Misc.* p. 57.

"Black, with minute white-tipped tubercles; back with cross bands of white spots, the two front bands lunate; tail with eight white spots: the first small, the next round, the rest oblong, longer towards the tip, last spot subapical; beneath grey, brown-marbled; head grey, occiput with three diverging, and the sides of the throat with two black streaks."

This species has been described by Dr. J. E. Gray from a specimen in Fort Pitt Museum; it is said to be from Prince of Wales Island (Pulo Pinang).

GECKO MONARCHUS.

Platydictylus monarchus, Dum. & Bibr. *Erpét. gén.* iii. p. 335. Cantor, *Catal. Mal. Rept.* p. 19. *Gecko monarchus*, Gray, *Lizards*, p. 161.

Back covered with small flat granulations and with numerous small, rounded, conical tubercles, arranged in irregular longitudinal series; scales of the middle of the belly in about forty-four longitudinal series; preanal and femoral pores thirty-two, disposed in two curved, continuous series; twelve upper and eleven lower labials; the front pair of chin-shields are much longer than the first lower labial. Head longer than broad. Tail with band-like, narrow, irregular subcaudals. Above buff or ash-coloured, or reddish brown, with from eight to twelve pairs of irregularly rounded, approximate, brownish-black spots along the vertebral line; head, limbs, and sides with numerous, more or less distinct, irregular dark-brown spots; the tail of immature specimens whitish, with brown rings.

This species attains to a length of 7 inches; the newly-hatched animal is $2\frac{1}{2}$ inches long. It is found on the Philippine Islands, in Amboyna, Borneo, on the Malayan Peninsula, and in Ceylon. Cantor says that this species possesses the power of changing its ground-colour in a greater degree than any other Gecko. It is very numerous at Pinang, swarming at night in rooms, occasionally giving out a sound resembling the monosyllable "Tok," repeated six or eight times with increased celerity. They are pugnacious among themselves, two or more sometimes fighting for an insect.

GECKO JAPONICUS.

Platydictylus japonicus, Dum. & Bibr. *Erpét. gén.* iii. p. 337.

— *jamori*, Schleg. *Faun. Jap., Rept.* p. 103. pl. 2. figs. 1-4.

Gecko chinensis, Gray, *Zool. Misc.* p. 57.

Hemidactylus ianus, Cantor, *Ann. & Mag. Nat. Hist.* 1842, ix. p. 482.

Back minutely granulated, with numerous very small, rounded, conical tubercles, arranged in irregular series; scales of the middle of the belly in about forty-two longitudinal series;

nine or ten upper and ten or eleven lower labials; the front pair of chin-shields small, not longer than the first lower labial; a short series of from seven to twelve pores before the vent. Head longer than broad. Tail with the subcaudals enlarged. Brownish, back marbled with darker; a brown streak between the anterior angles of the orbit, across the forehead. A dark streak through the lower part of the orbit, indistinctly edged with whitish above.

This species attains to a length of 5 inches; it is found in Southern Japan, China, Chusan, and Formosa. It is a house Gecko.

GECKO SWINHONIS. (Plate XII. fig. A.)

Back minutely granulated, with six or eight rather irregular series of distant, very small tubercles; scales of the middle of the belly in about forty longitudinal series; eight or nine upper and as many lower labials; the front pair of chin-shields is small, shorter than the first lower labial; nine pores before the vent. Head longer than broad. Tail with the subcaudals enlarged. Greyish, back marbled with darker; head uniformly coloured.

A single specimen, $4\frac{1}{2}$ inches long, was sent home from Northern China by Mr. Swinhoe.

GECKO SUBPALMATUS. (Plate XII. fig. B.)

Upper parts covered with uniformly minute granulations; scales of the middle of the belly in about forty-eight longitudinal series; scales on the inner side of the femur minute; ten upper and eight lower labials; the front pair of chin-shields are considerably smaller than the first lower labial. Tail slightly depressed, with a series of enlarged subcaudals. Fingers not webbed; the four inner toes with a very distinct web. No fold of the skin in the ham. Greyish above, clouded with darker, the darker parts forming a very indistinct angular band on the neck, and cross streaks on the back and tail.

The single specimen observed was obtained from Chikiang (China); it is 4 inches long (the tail measuring one-half), and apparently a female. There are no pores,—only scarcely visible impressions on a series of preanal scales; I doubt whether the male has any femoral pores. A large lump of calcareous matter occupies each side of the neck below the skin.

PTYCHOZOOON, *Kuhl.*

Fingers and toes dilated, united in their whole length by a web, with a series of undivided, imbricate, transverse plates below; four claws to each foot; sides of the head, body, tail, and of the limbs with broad, wing-like expansions of the skin.

Only one species is known.

PTYCHOZOOON HOMALOCEPHALUM. *The Flying Gecko.*

Lacerta homalocephala, *Crevelt*, *Schrift. naturf. Freund. Berl.* iii. p. 266. tab. 8.

Gecko homalocephalus, *Tiles. Mém. Acad. Pétersb.* vii. tab. 10.

Ptychozoon homalocephalum, *Kuhl. Isis*, 1822, p. 475. *Cantor, Mal. Rept.* p. 20.

Pteropleura horsfieldii, *Gray, Philos. Mag.* ii. p. 56.

Platydictylus homalocephalus, *Dum. & Bibr.* iii. p. 339. pl. 28. fig. 6, & pl. 29. figs. 1 & 2.

This Gecko has all the general characters of the preceding genus, but its integuments are dilated into broad folds, forming wing-like expansions along the sides of the whole animal, somewhat resembling those of the *Dragons* in form and function. One of these flaps is situated below the tympanum, extending from the angle of the mouth to the side of the neck; the largest runs along the side of the trunk, and is nearly as broad as the body; each side of the tail is fringed with a series of from fifteen to twenty rounded lobes, which are confluent into a broad, thin flap towards the extremity of the tail; when the tail has been broken off and is reproduced, the lobes are not separate in the reproduced portion, but always confluent; each leg has a broad expansion of the skin in front and behind, and the fingers and toes are united by a broad web. The upper parts of the body are finely granular, with four or six series of small tubercles, which are continued on the tail; the expansions are covered with transverse series of quadrangular scales; tail without enlarged subcaudals. There are twenty-five pores in a single series running across the preanal region and slightly angular in front. There are three plates above the rostral, the two lateral of which touch each other; twelve upper and thirteen lower labials; the front pair of chin-shields elongate.

The colours during life have been noted by Cantor. The ground-colour of the head and of the back yellowish-green olive, of the sides reddish brown. Between the eye and snout a double figure, in whitish outline, representing in front a broad arrow-head, posteriorly united by a narrow stalk to a rectangular transversal band, situated in front of the eyes. On the vertex another larger figure, traced in whitish outline, rectangular in front, spreading like a four-rayed star over the occiput. A dark-brown band proceeds from behind the eye across the ear to the shoulders, where it joins the anterior black transversal line; the flaps on the cheeks are of a pale flesh-colour, with dark-blue spots. Iris rich golden brown. From four

to six distant, undulated, black dotted lines cross the back, others the tail and the limbs. On each elbow a whitish ring. All the light markings disappear in preserved specimens; and the whole of the ground-colour is a reddish brown.

This very handsome Gecko attains to a length of 7 inches, of which the tail takes one-half. It is found chiefly in Java and in a few other islands of the East Indian Archipelago. Pinang, Singapore, and the Island of Ramree appear to be the only places where it has hitherto been found in British India. The expansions of the skin have the same purpose as the wings of the Dragons and of the Flying Squirrels; in leaping, these membranes are expanded by the pressure of the air from below, and act as a parachute. When the Gecko is at rest, they are kept in close contact with the body by muscles attached to their inferior surface. Cantor kept a pair of these lizards for some time in confinement; he observed that, like other Geckos, they have in some degree the power of changing the ground-colour from a darker to a lighter shade. A female deposited a single egg, of a spherical form, about half an inch in diameter, soft*, and of a yellowish-white colour, which the following day she devoured. A male ate the integuments he had been changing. This lizard also has a rounded mass of calcareous matter on each side of the neck; it is a very thin layer in most of the specimens, but in others it is considerably enlarged, and visible externally as a globular swelling.

HEMIDACTYLUS, *Cuv.*

Fingers and toes dilated, ovate, with two series of transverse, imbricate plates beneath; thumb and inner toe with the ungual phalanx compressed and clawed, the claw sometimes being minute; sides of the trunk without cutaneous appendage; tail with the lateral edge not serrated.

Species of *Hemidactylus* occur in almost every part of the tropical regions; the following are known from British India:—

* *Back granular, with numerous trihedral tubercles.*

Some of the tubercles are as large as the opening of the ear, of a white colour. *H. triedrus*, p. 107.
All the tubercles smaller than the opening of the ear; eight lower labial shields. *H. maculatus*, p. 107.
All the tubercles smaller than the opening of the ear; ten lower labial shields. *H. sykesii*, p. 108.

** *Back granular, with very small, scattered, conical tubercles.*

Pores running across the preanal region; no yellow lateral band. *H. frenatus*, p. 108.
Femoral pores not continued on into the preanal region; no yellow lateral band. *H. leschenaultii*, p. 109.
A yellow streak runs from the muzzle to the tail. *H. punctatus*, p. 109.

*** *Back uniform granular, almost without any tubercles: Boltalis, Gray.*

Greyish, marbled with darker. *H. coctei*, p. 109.

* Probably premature.

Note.—Mr. Blyth describes a Gecko from Mergui under the name of *Leirus berdmorei* (Journ. As. Soc. Beng. xxii. p. 646), referring it to a West African genus distinguished from *Hemidactylus* by having the tail rounded, not depressed, and without tubercles. Considering that the tail of a *Hemidactylus* is smoother and more rounded when reproduced than before it was broken off, we are justified in expressing our doubts whether this new species of Mr. Blyth really belongs to the West African genus *Leirus*, and we can only regret the shortness and indistinctness of the description :—

"*Leirus berdmorei*.—Agrees with Mr. Gray's definition of *Leirus*, except that there is no appearance of the toes being webbed at the base. Colour grey, with four longitudinal blackish streaks along the back and sides; three or four interrupted cross bands of the same on the upper surface of the tail, a medial black streak on the nape, and others successively diverging on each side of it, and a black streak from before the eye continued to the shoulder. Some mottling also on the limbs."

HEMIDACTYLUS TRIEDRUS.

Gecko triedrus, Daud. Hist. Rept. iv. p. 155. Wolf, Abbild. merkw. naturh. Gegenst. tab. 20. fig. 2.
Hemidactylus triedrus, Less. in Bélanger. Voy. Ind. Orient., Rept. p. 311. pl. 5. fig. 1. Dum. & Bibr. iii. p. 356. Kelaart, Prodr. Faun. Zeyl. i. p. 157.

Back with numerous trihedral tubercles, some of which are as large as the opening of the ear; back of the tail with cross series of similar tubercles; nine or ten upper and eight lower labials. The scales of the middle of the belly form thirty longitudinal series. The series of femoral pores are not continuous across the preanal region. Brownish olive: some of the dorsal tubercles are white, surrounded by a deep-brown ring; these ocelli are frequently confluent, forming cross bands; a brown, white-edged streak behind the eye.

Localities.—Madras; coast of Malabar: on rocks and trees. According to Kelaart it is rare in Ceylon; he obtained a few specimens at Trincomalee, where it is found in ant-hills; he never saw it in houses or on trees; it lays from three to six eggs, and attains to a length of 7 inches.

H. subtriedrus, Jord., Calc. Journ. As. Soc. Beng. xxii. p. 467, from the Nellore district in the Indian Peninsula, is so insufficiently characterized that we cannot decide whether it is distinct from, or identical with, *H. triedrus*.

HEMIDACTYLUS MACULATUS.

Hemidactylus maculatus, Dum. & Bibr. iii. p. 358. Gray, Lizards, p. 153. Kelaart, Prodr. Faun. Zeyl. i. p. 158.
Nubilia argentii, Gray, Lizards, p. 278.
? Hemidactylus pieresii, Kelaart, l. c. p. 159.

Back with numerous trihedral tubercles of moderate size, all being considerably smaller than the opening of the ear; tail rather depressed, with numerous small spines along its

lower lateral edge; back of the tail with cross series of spinous tubercles which are larger than those on the trunk. Eleven upper and eight lower labials. The scales of the middle of the belly form from thirty-seven to forty-one longitudinal series. The series of femoral and preanal pores are but slightly interrupted in the middle of the preanal region, or sometimes continuous. Brownish olive above, irregularly spotted or banded with brown; a brown band runs from the first upper labial through the eye to above the ear.

This appears to be the most common species of India; we have seen specimens from China, Lahore, Bengal, Singapore, Ceylon, and from the Anamallay Mountains. According to Bibron it is found also in the Philippine Islands and in Mauritius. It is one of the common House Geckos.

HEMIDACTYLUS SYKESII. (Plate XII. fig. C.)

Back with numerous trihedral tubercles of moderate size, all being considerably smaller than the opening of the ear. Tail rounded and smoothish on the sides, with cross series of tubercles above, which are larger than those on the trunk. Eleven or twelve upper and ten lower labials. The scales of the middle of the belly form forty or forty-two longitudinal series. The series of femoral pores are not continued on into the preanal region. Brownish olive above, with cross series of rounded brown spots, sometimes confluent into bands; two brown streaks behind the eye, and one before it.

The single specimen which I have observed of this species, and which is in the British Museum, is $7\frac{1}{2}$ inches long, and was brought by Colonel Sykes from the Deccan.

HEMIDACTYLUS FRENATUS. *The Cheecha of Ceylon.*

Hemidactylus frenatus, *Dum. & Bibr.* iii. p. 366. *Kelaart, Prodr. Faun. Zeyl.* i. p. 161.

Back with scattered, very small, obtusely conical tubercles; tail but slightly depressed, with cross series of small spinous tubercles above. Eleven upper and nine lower labials. The scales of the middle of the belly form about forty longitudinal series. The series of femoral pores are continuous across the preanal region, or but slightly interrupted in the middle. Brownish olive above, irregularly marbled with darker; sometimes a dark band through the eye; sometimes of uniform coloration.

We have observed specimens of this species from Ceylon, Pinang, Singapore, from Siam and Gamboja, from Bengal and Assam. According to Bibron the same species would occur in Southern Africa, in the East Indian Archipelago, and in Polynesia. It scarcely ever exceeds the length of 4 to 5 inches; and is one of the most common House Geckos, seen soon after sunset in search of prey, which consists of flies and other insects. It does not reject boiled rice and crumbs of bread, always returning to the spot where it has been thus

fed before. It is also frequently met with on trees and on rocks. The female lays three or four eggs, in crevices of old walls or in the hollows of trees.

HEMIDACTYLUS LESCHENAUTII.

Hemidactylus leschenaultii, *Dum. & Bibr.* iii. p. 364.

? *Hemidactylus leschenaultii*, *Jerd. Calc. Journ. As. Soc. Beng.* xxii. p. 468.

Very similar to *H. frenatus*, with which it agrees in the structure, size, and number of the scales and tubercles. Eleven or twelve upper and ten lower labials. The series of femoral pores are not continued on into the præanal region. Olive-coloured, marbled with grey.

I have received this species only from Madras and from the Anamallay Mountains, where it was found by Captain R. H. Beddome. The largest specimen is $5\frac{1}{2}$ inches long.

The following description of a *Hemidactylus* has been given by Mr. Jerdon; it does not contain any character of importance by which this Gecko may be distinguished from the others:—

Hemidactylus punctatus, *Jerd. Calc. Journ. As. Soc. Beng.* xxii. p. 467. "Back with some larger conical scales, and subcaudal scutes very large; scales of abdomen dotted, brown above; limbs and tail reddish, with dark bands; a pale-yellow streak from muzzle to tail, bordered beneath by a dark line; another dark line from nostrils to behind the eye." A single specimen was obtained in a house at Tellicherry.

HEMIDACTYLUS COCTÆI.

Hemidactylus coctæi, *Dum. & Bibr.* iii. (1836) p. 365. *Cantor, Mal. Rept.* p. 23.

Boltalia sublevis, *Gray, Zool. Misc.* 1842, p. 58. *Kelaart, Prodr. Faun. Zeyl.* ii. p. 18.*

Back uniform granular, without tubercles, except a short series of four or five very small ones running on each side of the sacral region. Tail rather depressed at the base, verticillated, finely granular above, with an enlarged, scale-like tubercle on each side of the lower part of each verticillus. From twelve to fourteen upper and eleven or twelve lower labials. The scales of the middle of the belly form thirty-six longitudinal series. The series of femoral pores are not continued on into the præanal region. Olive-coloured, uniform or marbled with grey.

Localities.—Patna, Pinang, Bombay, Ceylon. Length 6 or 7 inches. Living on trees and on the roofs of houses.

The thumb of this species has a minute claw, which is easily lost, and then the species may be (and has been) described as having a clawless thumb.

* Kelaart (*Prodr. Faun. Zeyl.* i. p. 160) mentions a *Hemidactylus coctæi* as a species distinct from *Boltalia sublevis*; I have not been able to identify this *H. coctæi* of Kelaart.

PERIPIA, *Gray.*

Fingers and toes dilated, ovate, with two series of transverse, imbricate plates beneath; thumb and inner toe without unguis phalanx, clawless: claws 4—4. Sides of the trunk without cutaneous appendage.

Peripia is very similar to *Hemidactylus*; one species is found in Mauritius, another in Australia, and the following in British India:—

- Chin anteriorly with two or three pairs of elongate shields *P. peronii*
 Chin anteriorly with numerous, subequal, very small shields *P. cantoris*.

PERIPIA PERONII.

Hemidactylus peronii, *Dum. & Bibr.* iii. p. 352. pl. 30. fig. 1. *Cantor, Catal. Mal. Rept.* p. 22.
Kelaart, Prodr. Faun. Zeyl. i. p. 187.

Back uniform granular, without any tubercles. Scales of the middle of the belly in about forty-four or forty-six longitudinal series. Tail rather depressed, sometimes with a sharpish, minutely serrated lateral edge, and with a series of enlarged subcaudals below*. Pupil erect. From seven to nine upper and from seven to eight lower labials: three pairs of elongate chin-shields on the anterior part of the chin; the shields of the outer pair are the smallest, and sometimes broken up into smaller pieces. Cutaneous fold in the ham developed. The præanal and femoral pores, thirty-seven in number, form one continuous series, angularly bent and extending along nearly the whole length of the femur. Ash-coloured above; labials whitish, each with a brown spot.



This species, which attains to a length of from 4 to 5 inches, was first described from specimens from the Isle of France, and has been found by Cantor in houses in the valley of Pinang, and by Kelaart at Kaduganava, Ceylon, where it frequents trees.

PERIPIA CANTORIS.

Platydictylus lugubris, *Cantor, Mal. Rept.* p. 16 (not *Dum. & Bibr.*).

Back uniform granular, without any tubercles. Scales of the middle of the belly in

* In a female specimen from Pinang, in which the tail had been broken off and is reproduced, this member is swollen at the base, and terminates in a dilated flap.

about forty longitudinal series. Tail rather depressed, with a sharpish, non-serrated lateral edge, entirely granular, without enlarged subcaudals*. Pupil elliptical, erect. Twelve upper and eight lower labial shields; the chin behind the front labial is covered with numerous, subequal, very small shields. The lamellæ of the thumb are angularly bent, but not divided into two. Cutaneous fold in the ham rudimentary. Uniform brownish olive.



The single specimen observed is in the British Museum, which received it from Pinang through Dr. Cantor, who named it *Hemidactylus peronii*, D. & B. It is 3 inches long.

NYCTERIDIUM.

Fingers and toes dilated, ovate, with two series of transverse, imbricate plates beneath; thumb and inner toe with a compressed ungual phalanx and with a claw. Sides of the trunk with a cutaneous expansion. Tail flattened, serrated on the sides.

This genus is identical with *Platyurus*, Gray, a name preoccupied for a genus of Sea Snakes. It is a modified form of *Hemidactylus*, to which it stands in the same relation as *Ptychozoon* to *Gecko*. Only one species is known.

NYCTERIDIUM SCHNEIDERI.

Stellio platyurus, *Schneid. Denkschr. Acad. Wiss. Münch.* 1811, tab. 1. fig. 3.

Lacerta schneideriana, *Shaw, Zool.* iii. p. 278.

Hemidactylus platyurus, *Wieg. Act. Ac. Leop. Carol. Nat. Cur.* xvii. p. 288.

— *marginatus*, *Wieg. Amph.* p. 145. *Dum. & Bibr.* iii. p. 370. pl. 30. fig. 2 (not good).

Platyurus schneiderianus, *Gray, Lizards*, p. 157.

Back uniform granular, without any tubercles. Scales of the middle of the belly in thirty-eight or forty-two longitudinal series. Tail strongly depressed, with compressed and finely serrated lateral edges, uniform granular above, scaly beneath, with a series of enlarged subcaudals along the middle. Nine or ten upper and as many lower labials; two pairs of mental shields. The hind limb with a broad cutaneous fringe behind. Olive-coloured above, uniform or marbled with darker; an irregular brownish band runs through the eye along the side of the body.

This species is found throughout the East Indian Archipelago, in Assam and Bengal; it is common in Siam and at Pinang. Kelaart has sent two specimens from Ceylon. It attains to a length of $4\frac{1}{2}$ inches.

* In the single specimen observed the tail had been broken off and is reproduced.

PHELSUMA, *Gray.*

Fingers and toes free, rather elongate, with the base rather slender and with the extremity dilated, ovate below, provided with undivided, imbricate, transverse plates; claws none.

We admit this genus on account of a species described by Mr. Blyth as follows:—

PHELSUMA ANDAMANENSE.

Phelsuma andamanense, *Blyth, Journ. As. Soc. Beng.* xxix. p. 108.

Opening of the ear round; chin with a series of five plates of equal size, and larger than the rest, anteriorly adjoining the labial plates; no femoral or preanal pores. A pale mesial line commences on the nape and is continued half way along the back, the rest of the upper parts being sprinkled with numerous orange spots; disks of the toes dark-coloured.

Andaman Islands. Head and body 2 inches, tail (renewed) $1\frac{1}{2}$ inch.

GYMNODACTYLUS, *Spir.*

Each finger and toe is composed of two portions: a basal portion, depressed, and provided with a series of transverse plates beneath; and a terminal portion formed by two compressed, more or less slender phalanges; claws five to each foot, free, without sheath. Tail cylindrical, tapering.

We refer the following species from British India to this genus:—

* *Back and sides granular, with intermixed larger tubercles.*

- | | |
|---|--------------------------------|
| Tubercles numerous, trihedral; body uniformly coloured | <i>G. triedrus</i> , p. 113. |
| Tubercles numerous, conical; body with regular broad black cross bands | <i>G. pulchellus</i> , p. 113. |
| Tubercles in six or eight series; body with irregular dark cross bands | <i>G. fronsatus</i> , p. 113. |
| A few minute, spine-like tubercles on the side; a single series of subcaudals | <i>G. kandianus</i> , p. 114. |
| Two or three distant rows of spines on each side; three series of subcaudals | <i>G. mysorensis</i> , p. 114. |

** *Back and sides uniformly granular, without tubercles.*

- | | |
|--|-----------------------------|
| Five or six lower labials | <i>G. indicus</i> , p. 115. |
| (<i>G. malabaricus</i> et <i>G. littoralis</i> , p. 115.) | |

*** *Back covered with uniformly large tubercles, not separated by granulations.*

- | | |
|--|---------------------------------|
| Trunk with three regular, white, black-edged cross bands | <i>G. deccanensis</i> , p. 115. |
| Trunk marbled or irregularly cross-banded | <i>G. variegatus</i> , p. 116. |
| (<i>Gymnodactylus fasciatus</i> , p. 116.) | |

GYMNODACTYLUS TRIEDRUS.

Back granular, studded all over with small trihedral tubercles; (tail (reproduced) uniformly granular above, with small irregular scales beneath, rather thick, tapering). Ten upper and nine lower labials; nostril immediately behind the rostral; preanal or femoral pores none (in the single specimen observed); scales of the middle of the belly in about thirty longitudinal series. Limbs and toes moderately slender. The two terminal joints of the fingers and toes are compressed, not very distinct from the basal joints, which are provided with transverse disks below. Uniform brown; tail with four indistinct rings of irregular whitish spots.

Ceylon. The single specimen observed is in the British Museum; it is nearly 4 inches long, and not in a very good state of preservation.

GYMNODACTYLUS PULCHELLUS.

Cyrtodactylus pulchellus, Gray, *Phil. Mag.* ii. p. 56, and *Ind. Zool., Rept.* tab.
Gymnodactylus pulchellus, Wagl. *Amph.* p. 144. Cantor, *Catal. Mal. Rept.* p. 25.

Body finely granular, with numerous conical (in old specimens, three-sided) tubercles of moderate size. Eleven or twelve upper and lower labials; the median lower labial is triangular, produced backwards between the anterior chin-shields, which are rather elongate. The scales of the middle of the belly form twenty-six longitudinal series; the series of femoral pores extends along nearly the whole length of the thigh, and is bent forwards in the middle of the preanal region, where it is continued into a short longitudinal groove in the skin; each half of the series is composed of nineteen pores. Subcaudals enlarged. The two terminal joints of the fingers and toes are much compressed, and very distinct from the basal joints, which are provided with a series of transverse disks. Brownish yellow: the nape of the neck and the back with six broad brownish-black cross bands edged with yellow; the two anterior bands crescent-shaped. Tail with eight or nine rings of the same colour, but without yellow margin.

This beautiful species is found in elevated parts near Pinang and Singapore, and attains to a length of 10 inches. Cantor says that its habits are similar to those of other Geckos; it bites fiercely in defence; in captivity it refuses insects*. The integuments, when about being renewed, are torn off piecemeal by the teeth and devoured. A single egg deposited was of a spherical form, about half an inch in diameter, of a whitish-yellow colour.

GYMNODACTYLUS FRÆNATUS. (Plate XII. fig. D.)

Body granular, with six or eight series of very small tubercles; tail uniformly granular,

* I should recommend as food other small Geckos or lizards.

without tubercles, and with enlarged subcaudals below. Eleven upper and nine lower labials; the median lower labial is of moderate size; the front pair of chin-shields form a long suture together. Nostril immediately behind the rostral. A group of enlarged scales and two pairs of pores in the preanal region; scales of the middle of the belly in about thirty-four longitudinal series. Pupil erect, denticulated. Limbs and toes moderately slender. The two terminal joints of the fingers and toes are much compressed, and distinct from the basal joints, which are provided with transverse disks below. Light brownish, with dark-brown markings: a broad band proceeds from behind the eye to the side of the neck, where it joins two irregular broad cross bars, the one behind the occiput, and the other between the shoulders; two or three similar cross bars on the back of the trunk, and broad brown rings round the tail. All these markings are much less distinct in old age than in immature specimens, being indicated only by irregular black outlines.

We have received this fine species only from Ceylon; it attains to a length of 7 inches. Figure D of Plate XII. represents the animal of the natural size, figure D' the anal region.

GYMNODACTYLUS KANDIANUS.

Gymnodactylus kandianus, Kelaart, *Prodr. Faun. Zeyl.* i. p. 52.

Body finely granular, with a few scattered conical tubercles along the side and in rings across the tail; each tubercle acute, like a spine; some specimens are nearly entirely smooth. Eight upper and seven lower labials; the median lower labial is large, entirely separating the front chin-shields, which are smaller than the first lower labial. Femoral or preanal pores none; subcaudals generally enlarged. Pupil round. Limbs and toes slender. The two terminal joints of the fingers and toes are much compressed, but not very distinct from the basal joints, which are provided with transverse disks below. Brownish grey, marbled with brown; fingers and toes annulated with brown.

This species appears to have been discovered by Kelaart, who, however, so far as we know, has never described it; specimens with the name of *Gymnodactylus kandianus* have been sent by him to the British Museum. It is a small diurnal species, 3 inches long, and very abundant on every house in Kandy and Kaduganava.

GYMNODACTYLUS MYSORIENSIS.

Gymnodactylus mysoriensis, Jerdon, *Journ. As. Soc. Beng.* xxii. p. 469.

Back granular, with two or three distant rows of spines on each side, and extending along the tail; scales of the tail imbricate, with three rows of larger nail-shaped scutes below; scales of the basal joints of the fingers and toes enlarged, nail-shaped. Greyish brown, with a light stripe down the centre of the back, and a series of dark-brown marks on the head, back, and sides; legs and feet banded.

Two and a half inches long. Bangalore, frequenting rocks and also entering out-houses. The young has the tail flesh-coloured. Two or three femoral pores on each side. We have never seen this species.

GYMNODACTYLUS INDICUS.

Goniiodactylus indicus, Gray, *Ann. & Mag. Nat. Hist.* 1846, xviii. p. 429. *Jerdon, Journ. As. Soc. Beng.* xiii. p. 460.

Head depressed, rather short, of moderate size. Body and tail uniformly coarsely granular, without tubercles; tail without enlarged subcaudals. Eight upper and five or six lower labials; the median lower labial is very large, entirely separating the chin-shields from each other. Nostril immediately behind the rostral; pupil round. Femoral or præanal pores none. Limbs and toes moderately slender. The two terminal joints of the fingers and toes are compressed, and not very distinct from the basal joints, which have transverse disks below. Brownish or greenish, irregularly marbled with darker along the vertebral line.

A small species from the Nilgherries, three inches long. Jerdon says that it conceals itself under stones in the daytime; whilst we should have supposed it to be a diurnal species, as it has the pupil of the eye round. He procured it on the top of Dodabetta, the highest mountain of the group, and has also found it in Coorg. Its colours, when fresh, are of a mottled brown, or greenish brown, with a row of yellow spots along the back, edged with darker, and a series of similarly coloured spots on each side.

Mr. Jerdon distinguishes two other species with a uniform granular covering of the back, but they are so insufficiently characterized that it will be difficult to recognize them:—

a. *G. malabaricus*, Jerd. *l. c.* p. 469.—Dark brown above, marbled with black spots, and a white spot on the nape. 2½ inches long. Forest of Malabar.

b. *G. littoralis*, Jerd. *l. c.*—Very slender; pale brown, with a series of paler marks along the back and tail; a black spot on the nape. 2½ inches long. Sea-coast of Malabar.

GYMNODACTYLUS DECCANENSIS. (Plate XII. fig. E.)

Head finely granular; body covered with flat subequal tubercles of moderate size, disposed in transverse series; tail rounded, tapering, covered with rings of square subequal scales; ventral scales small; (femoral and præanal pores none, in the single specimen observed). Eleven upper and nine lower labials; the front pair of chin-shields are oblong, and form a suture together. Limbs and toes rather slender; the two terminal joints of the fingers and toes are much compressed, and not very distinct from the basal joints, which are provided with very narrow transverse scales not dilated into disks. Reddish olive, with narrow

white, black-edged cross bands: the first is semicircular, running from one eye across the nape to the other eye; trunk with three and tail with five or six bands; a similar band across the forearm and across the lower hind leg.

This pretty species was discovered by Colonel Sykes in the Deccan; a single specimen in the British Museum is $4\frac{1}{2}$ inches long.

GYMNODACTYLUS VARIEGATUS.

Nautinus variegatus, *Blyth, Journ. As. Soc. Beng.* 1859, xviii. p. 279.

"Ungual and penultimate phalanges of toes long and compressed. Body and sides uniformly studded with large tubercles, which gradually disappear on the tail; the lower parts covered with large flat scales, bounded by a prominent ridge on each flank: series of femoral pores extending quite across, and behind these, anterior to the vent, four scales larger than the rest: a few small scales posterior to the vent, followed by a series of broad subcaudal plates. Scales upon head and throat minute, those on the face anterior to the eyes larger. Eyes large, with vertical pupils. Colour grey, beautifully spotted and marbled with black, set off with subdued white. Lower parts whitish, freckled on the tail with black, and gradually more of this to the extremity, the terminal third being almost wholly blackish; above, the tail is irregularly banded. A broad dark streak bordered with whitish behind each eye, and continued irregularly round the occiput. On the back the markings appear as irregular bands, paler internally and blackish on their zigzag borders, most difficult to describe intelligibly; the head above is spotted and not banded."

Moulmein. Entire length $6\frac{1}{2}$ inches, of which the tail measures $3\frac{1}{2}$ inches.

GYMNODACTYLUS (?) FASCIOLATUS.

Nautinus (?) fasciolatus, *Blyth, Journ. As. Soc. Beng.* xxix. p. 114.

A dark band from behind the eye, abruptly bent to meet its opposite on the occiput; twenty-three other blackish cross bands continued to the end of the tail, those of the body being edged with whitish posteriorly; subcaudals enlarged; no larger scales before the vent.

Subathoo. $4\frac{1}{2}$ inches long, of which the tail is $2\frac{1}{2}$ inches.

It is very doubtful whether this species belongs to the present genus; Mr. Blyth has compared it with *G. variegatus* and considers it as congeneric with that species. The colours are the only character given by him by which we may recognize this species.

PENTADACTYLUS, *Gray*.

Fingers and toes but slightly dilated in their basal half, with a series of undivided, imbricate transverse plates below the dilated portion, the ungual half being compressed and angularly bent; all the fingers and toes clawed, each claw being retractile into a compressed, bilobed sheath.

Only three species are known—two from British India; the other, undescribed, from Borneo.

* Snout above with five shields behind the rostral.

a. Brown, sides of the body with some scattered pearl-coloured dots; the upper and lower parts of the tail with irregular white spots, each being composed of dots *P. borneensis*, n. sp.*

b. A double series of light ocellated spots along the back *P. felinus*, p. 117.

** Snout with a single shield above behind the rostral; part of the nostril formed by the rostral *P. duranellii*, p. 118.

PENTADACTYLUS FELINUS. (Plate XII. figs. F, F'.)

The habit of this lizard is rather slender; the head is depressed, elongate-triangular, very distinct from the neck; trunk somewhat thin; tail tapering, slightly compressed; limbs slender, fingers and toes rather short. All parts are finely granular. There are two series of shields above and behind the rostral, two in the anterior series, and three in the posterior; nostril in the hind part of a shield contiguous with the rostral; another small shield above it. Twelve upper and ten lower labials, which are longer than high; the lower labials are accompanied by a series of similar chin-shields. (Two angular series of scales larger than the rest, before the preanal region, from which they are separated by a furrow.) Pupil erect; tympanum sunk; opening of the ear rather small, round. Limbs rather slender, the fore limb extending beyond the orbit when laid forwards. Fingers and toes rather short; the basal phalanges are but very slightly dilated, provided with a series of narrow transverse plates beneath; the penultimate and ungual phalanges are strongly compressed; each claw is hidden below a compressed cap-like sheath, which is bilobed in front, the sheath having the appearance of a strong, compressed claw. The upper parts are brownish; head marbled with lighter above; two series of large, irregularly rounded light spots, edged with dark brown, run along the back; upper lip whitish; lower parts whitish, speckled with brown; tail with some irregular black spots edged with lighter.

A single specimen, said to be from Singapore, is in the British Museum Collection; head and body $3\frac{1}{4}$ inches, tail (renewed) 2 inches. Figure F of Plate XII. represents the animal of the natural size, figures F' the structure of the claws magnified: viz. the right-hand figure

* Otherwise very similar to *P. felinus*.

is a lateral view of the sheath, showing the swollen dorsal ridge; in the left-hand figure one lateral half of the sheath has been removed, so that the retracted claw may be seen; finally, the central figure is a front view, showing the dorsal ridge and the two lobes of the sheath, with the point of the claw in the middle.

PENTADACTYLUS DUVAUCELI.

Platydactylus duvaucelii, *Dum. & Bibr.* iii. p. 312.

Pentadactylus duvaucelii, *Gray, Lizards*, p. 160.

The nostrils are surrounded by four small shields, by the first labial, and by the rostral. Rostral shield large, notched above, receiving in its notch a small shield situated on the upper side of the head, between the two nasal shields. Twelve upper and eleven lower labials, which are higher than long. Opening of the ear large, ovate. Males with five angular concentric series of pores before the vent, the posterior series being composed of five scales, the anterior of forty-six.

The specimens described by Bibron are said to have been brought from Bengal. Bibron does not mention the peculiar structure of the sheath of the claw; but in other points his description of this Gecko agrees so well with the species observed by us that we can scarcely doubt that they are congeners. Bibron's specimens were 10 inches long, the tail measuring $5\frac{1}{2}$ inches.

PUELLULA, *Blyth*.

Toes not dilated, but distinctly ribbed, except on the ungual phalanges. A distinct rudimentary dorsal crest. No femoral or præanal pores, but a large, raised glandular space at the base of the thighs underneath, divided by a slight median groove on the anterior half, which deepens to form a large glandular cavity on the posterior half. (This structure is less developed in the female.)

PUELLULA RUBIDA.

Puellula rubida, *Blyth, Journ. As. Soc. Beng.* xxix. p. 109.

Back granular, thickly studded with larger tubercles; tubercles on the tail in transverse series; a fold of the skin along the side of the belly. Four large chin-shields, the medial of which exceed the outer in size. Colour of the fresh animal very ruddy; a dark line passes backward from the eye, and meets its opposite upon the occiput, this V-like marking being succeeded by one or two others like it; body with irregular narrow transverse bands com-

posed of black tubercles interspersed among the rest, and a series of broad dark annuli on the tail. Labials alternately dark brown and white.

Length about 5 inches, of which the tail is half. A common species at Port Blair (Andaman Islands).

The characters of the genus and species have been given after Blyth.

EUBLEPHARIS, *Gray*.

Fingers and toes not dilated or depressed, rather short, all clawed, and with a single series of simple, transverse, narrow scales below. The upper eyelid broad, prominent, the lower well developed. Tail cylindrical, tapering.

The single species of this genus differs in many respects from the Geckos. The form of its head and trunk is similar to that of the Geckos, but it is evidently a ground lizard, unable to climb walls or other erect objects with smooth surface. Its toes are not dilated at all, and rather short, without plates beneath, covered with transverse scales only, as in many other lizards. The claws are short. The head, body, and limbs are covered with tubercles, which are unequal in size on the back and the sides, the larger tubercles being separated from one another by a series of smaller ones. The lower parts are covered with small, imbricate, rhombic scales. A series of preanal pores in the male, absent in the female; there is an obtuse tubercle at the root of the tail, on each side behind the vent; tail thick, conical, verticillated, covered with rings of small subquadrangular scales, which pass into flat tubercles on the back of the tail; the tail is fragile and easily reproduced.

The tongue is flat, oblong, slightly nicked in front; teeth small, compressed. The nostril is lateral, in a single plate, situated above the first upper labial; a pair of small shields above and behind the rostral. The upper eyelid is broad, projecting, moveable, the lower well developed, granular. The pupil is subelliptical; tympanum very thin, deeply sunk.

EUBLEPHARIS HARDWICKII. (Plate XI. fig. B.)

Eublepharis hardwickii, *Gray, Zool. Journ.* iii. p. 223.

Pale reddish white; the upper part of the head from the nose to the nape, two very broad bands across the trunk, and three or four rings round the tail deep brown or black, the brown portions being edged with black, and broader than the ground-colour. Limbs reddish olive, with black dots on the elbows and knees. There are ten upper and lower labials; two chin-shields larger than the first lower labial. The scales of the middle of the belly form thirty longitudinal series; seventeen pores in an angular series in the preanal region.

This species attains to a length of from 8 to 9 inches. We have seen four specimens: one from Chittagong, two from Russelconda, Madras Presidency, and a fourth from the Anamallay Mountains, collected by Captain R. H. Beddome. W. Elliott, Esq., has also found it in the public bath at Waltair, a suburb of Vizagapatam.

FAMILY OF AGAMES—*AGAMIDÆ*.

Head covered with numerous, very small, flattish or convex shields. Tongue thick, attached to the gullet along its whole base, not, or but slightly, notched in front. Scales of the back, sides, and belly imbricate, generally rhombic. Tail long, tapering, not fragile. Eye and eyelids well developed; pupil round. Nostrils in a separate plate. Teeth implanted on the edge of the bones of the jaws; generally a pair of canine teeth in front of each jaw. Limbs well developed.

The family of Agames are spread over almost every part of the Old World and of Australia, being much less numerous in the temperate parts than in the tropical. They are Land Lizards—some, with a compressed body and with a long, more or less compressed tail, living on trees or bushes, whilst others, with a depressed body and with a shorter tail, inhabit rocks or plains. The most slender and the most gaily-coloured forms belong to the former division, the heavier ones with duller colours to the latter. They do not attain to any considerable size, and none of the Indian species exceed a foot in length, the tail not included. The greater part are insectivorous, but many feed on vegetables (seeds, fruits, leaves) as well as on animals. All are oviparous. The species of British India belong to the following genera:—

A. TREE AGAMES, slender in habit, with the body more or less compressed; tail very long.

1. Femoral pores none.

a. A wing-like expansion on each side of the body.

Throat with a more or less elongate appendage *Draco*, p. 121.

b. No lateral wings; tympanum hidden.

Hind leg longer than the body *Otocyrtis*, p. 127.

Body covered with minute scales, several distant series of large scales along the trunk; superciliary margins pointed behind *Lyriocephalus*, p. 128.

Scales of the upper part of the trunk unequal in size; an appendage on the nose, at least in the male *Ceratophora*, p. 129.

Body covered with very large, imbricate, irregular scales *Cophotis*, p. 131.

Body covered with small imbricate scales, between which larger ones are intermixed; hind legs shorter than the body; no rostral appendage *Japalura*, p. 132.

c. *No lateral wings; tympanum naked.*

* *Only four toes behind.*

Scales regularly arranged *Sitana*, p. 134.

** *Crest on the back very high, the lobes being united by a membrane.*

Scales minute, equal. *Dilophyrus*, p. 136.

*** *Five toes behind; lobes of the dorsal crest separate.*

Scales on the sides equal in size, regularly arranged, with the tips directed backwards and downwards; no spines on the head *Bronchocela*, p. 137.

Scales on the sides equal in size, regularly arranged, with the tips directed backwards and upwards; subcaudal scales as broad as long *Calotes*, p. 139.

Scales on the sides of moderate size, strongly keeled, arranged in longitudinal series; a series of some larger distant scales along the side; head without any spines *Sales*, p. 145.

Scales on the sides of moderate size, with the tips directed backwards and upwards; larger ones are scattered between the others; a spine behind the orbit; subcaudal scales as broad as long *Oriocalotes*, p. 146.

A spine behind the orbit; subcaudal scales longer than broad *Acanthosaura*, p. 147.

Scales on the sides very small, irregular, and unequal in size; a tubercle behind the orbit; subcaudal scales as broad as long; gular sac none *Oriolotaris*, p. 150.

Scales on the sides small, with scattered larger ones; no spine behind the orbit; gular sac present, at least in the males *Tiaris*, p. 151.

II. *Femoral pores present.*

Tympanum naked *Physignathus*, p. 152.

B. *Tree Agames, with the trunk depressed, and with a very long tail.*

Femoral pores present *Liolepis*, p. 153.

C. *Ground Agames, stout in habit, with the body depressed, and with the tail of moderate length.*

Femoral and preanal pores *Uromastix*, p. 155.

No pores; scales of the tail arranged in rings, those of the sides equal in size *Charasia*, p. 156.

No pores; scales of the tail arranged in rings, those of the sides unequal *Stellio*, p. 157.

Scales of the tail not arranged in rings; tympanum naked *Trapelus*, p. 159.

Scales of the tail not arranged in rings; tympanum scaly *Phrynocephalus*, p. 160.

(Appendix *Brachysaura*, p. 161.)

DRACO, Linn.

A semicircular membrane, supported by the five or six posterior (false) ribs, which are much prolonged, forms a sort of wing or parachute on each side of the body. A vertical appendage is suspended from the middle of the throat; a smaller horizontal fold of the skin on each side of the gular appendage.

The Dragons are entirely confined to the East Indies; they are more numerous in the

Archipelago than on the continent, but they have not yet been found in Ceylon. The character by which they are at once recognized is the peculiar additional apparatus for locomotion formed by the much-prolonged five or six hind ribs, which are connected by a broad expansible fold of the skin, the whole forming a subsemicircular wing on each side of the body. The Snakes are the only order in the whole animal kingdom in which the ribs serve as organs of locomotion; but whilst in that order all the ribs are charged with a function for which no other organ exists, in the Dragons only a part of the ribs are modified for the purpose of assisting four well developed limbs. The Dragons are Tree Lizards, and, jumping from branch to branch, they are supported in the air by their expanded parachutes, which are laid backwards at the sides of the animal while it is sitting or merely running. If the hind extremities of a Dragon were cut off, it would lie helpless on the ground; but it would still move with great velocity if it were merely deprived of its wings. The locomotion of the Dragons is a series of leaps, and not a continuous running: they are the *Anoles* of the Old World.

The species are extremely similar to one another, scarcely differing in size, and one general description will suffice for all. The head is thick and high, with a short, obtuse snout, covered with very small scales; the labial shields are low, varying in number*. The tongue is elongate-cylindrical, attached to the gullet in its whole length, not or but slightly notched in front. Two of the front teeth in the upper and lower jaws are larger than the rest. The nostrils are small, round, situated in a single, small, rather prominent shield: the direction in which they pierce this shield is of great importance for the distinction of the species. In some the nostrils are visible when the head is viewed from above (*Dracocella*), in others only from the side. The eye is of moderate size, with well developed eyelids, and with a round pupil, the Dragons being diurnal lizards delighting to bask in the sun. The tympanum is present in all species; but whilst it is naked and exposed in some, it is covered with small scales in others (*Dracunculus*); this difference also offers an important character for the distinction of the species, but less so than the nostril, as young examples of a species which usually has a scaly tympanum, sometimes show the centre of this membrane scaleless, whereby naturalists may be misled in their determinations.

The skinny appendages of the throat are merely folds of the skin, ornamental and sexual, like the wattles of the throat of gallinaceous birds; they have no cavity in their interior, and have no communication with the cavity of the mouth or with the respiratory organs. They are supported by the posterior horns of the hyoid bone, and can be erected or spread out when the animal is excited. Such appendages as those in the Dragons always betray an excitable temper. They are found in both sexes, one in the middle and one on each side of the throat; but they are much more developed in the mature male, where the middle gular appendage sometimes attains to a length thrice as great as that of the head. Most of the species have a short, low crest, formed by granular or triangular scales, along the middle of the neck, which also is more developed in the adult male than in the female and young, if present at all in a species. This nuchal crest is generally accompanied by small isolated or serial tubercles on the hind part of the head or on the side of the neck.

* In comparing the dorsal scales with the labial shields, in the specific descriptions, I have always taken the labials of middle size.

The trunk is rather slender, covered above and below with very small, more or less distinctly keeled scales. Large spaces on the wings are naked, and separated from one another by stripes of minute scales. The tail is long, slender, tapering to a point, not fragile; we have never seen a Dragon in which the tail had been reproduced, nor, indeed, with this member mutilated. Perhaps the tail is necessary for their peculiar locomotion, in which case its loss would soon prove fatal to the animal. The limbs are slender, each provided with five, clawed, thin and long toes. Their length varies a good deal in the different species, and is a very important character for their distinction.

Cantor says that "the transcendent beauty of their colours baffles description. As the lizard lies in shade along the trunk of a tree, its colours at a distance appear like a mixture of brown and grey, and render it scarcely distinguishable from the bark. Thus it remains with no signs of life except the restless eyes, watching passing insects, which, suddenly expanding its wings, it seizes with a sometimes considerable unerring leap. The lizard itself appears to possess no power of changing its colours." These beautiful colours * disappear almost entirely in spirits; there remain, however, certain markings of dark colour, which are of much greater importance for distinction of the species than those variable and perishable iridescent tints which are common to all the species.

From three to four ovate, whitish eggs are very frequently found in the females; they are three-eighths of an inch long. Almost all the species attain to the same length, viz. 7-8 inches, of which the tail takes one-half or rather more than one-half. *D. quinquefasciatus* appears to be somewhat larger than the others.

We give first a Synopsis of all the species of Dragons known, as we have had the opportunity of examining all of them, and proceed then to the descriptions of the new species and of those found in British India:—

1. *Short-limbed Dragons, in which the length of the hind limb is less than the distance between the shoulder and hip-joints.*

A. *Nostrils lateral, directed outwards.*

a. *Tympanum naked.*

1. Dorsal scales as large as the upper labial shields; no orbital spine. Throat dotted with brown; wings black-spotted below: *D. volans*, p. 124.
2. Dorsal scales as large as the upper labial shields; no orbital spine. Throat reticulated with brown; wings uniform whitish below: *D. reticulatus*, n. sp., p. 125.
3. The scales of the three median dorsal series large, larger than the labials; the middle series smooth, the two outer ones keeled, the keels being continuous: *D. timorensis*, Kuhl.
4. Dorsal scales smaller than the upper labials; a horn-like spine above the hinder angle of the orbit: *D. cornutus*, n. sp., p. 125.
5. Dorsal scales smaller than the upper labials; no orbital spine: *D. fimbriatus*, Kuhl.†

b. *Tympanum scaly.*

6. An interrupted series of large keeled scales along each side of the trunk: *D. maculatus*, p. 125.

* They will be more fully described under *D. volans*.

† Its occurrence in Singapore is more than doubtful.

7. A more or less distinct continuous series of rather larger keeled scales along each side of the posterior half of the back: *D. spilopterus*, Wieg. = *D. ornatus*, Gray.

B. *Nostrils directed upwards.*

8. Tympanum naked: *D. dussumieri*, p. 125.
9. Tympanum scaly: *D. quinquifasciatus*, p. 126.

II. *Long-limbed Dragons, in which the hind limb extends to or beyond the shoulder-joint, if laid forwards.*

A. *Nostrils directed upwards; tympanum naked.*

10. Wings with regular arched black bands: *D. leniopterus*, p. 126.
11. Wings with subreticulated lines: *D. haematopogon*, Boie.

B. *Nostrils directed outwards.*

12. Tympanum naked: *D. bimaculatus*, n. sp., p. 127.
13. Tympanum scaly; dorsal scales smaller than upper labials: *D. lineatus*, Daud.
14. Tympanum scaly; dorsal scales larger than, or as large as, the upper labials: *D. rostratus*, n. sp., p. 127.

DRACO VOLANS.

- Draco volans et præpos*, *L. Syst. Nat.* xii. p. 358.
— *viridis et fuscus*, *Daud. Rept.* iii. pp. 301, 307.
— *daudinii*, *Dum. & Bibr.* iv. p. 451.
— *viridis*, *Schleg. Abbild.* p. 89. tab. 24. fig. 1.
— *volans*, *Cantor, Mat. Rept.* p. 37.

The length of the hind limb is contained 1·2 or 1·3 times in the distance of the axils of the limbs. Nostrils lateral, directed outwards; tympanum naked. Dorsal scales subequal in size, as large as the upper labial shields, slightly keeled; a small short tubercle above the hind part of the orbit; male with a distinct nuchal crest; on each side of the back a series of larger, rhombic, keeled, distant scales. Throat and sides of the gular appendage with numerous brown dots. The outer part of the upper surface of the wings with large irregular black spots; their lower surface with large rounded spots, which are more or less confluent into bands towards the margin of the wings.

The colours vary much, not only according to the localities, but also individually; the brown or black dots on the throat appear to be constant. Cantor describes the colours from living specimens:—Head metallic brown or green, with a black spot between the eyes. Back and inner half of the wing-membrane varied with metallic, iridescent dark brown and rose-colour, in some disposed in alternate transversal bands, with numerous black spots and short irregular waved lines. Outer half of the wing-membrane orange- or rose-coloured, with irregular black transverse spots; the margins minutely fringed with silvery. Limbs and tail in some with alternate rose-coloured and brown cross bands. Eyelids with short, radiating black lines. Throat and gular sac bright yellow, the former dotted with black;

lateral pouches yellow or silvery rose, with black dots. Wings below with large brownish or blackish spots.

This species is found in Java, Sumatra, Borneo, and at Pinang and Singapore.

Note 1.—*Draco reticulatus* (n. sp.), from the Philippine Islands, is allied to *D. volans*. The length of the hind limb is contained 1.1 times in the distance of the axils of the limbs; male with a distinct nuchal crest, and with a similar crest along each side of the neck; on each side of the posterior half of the trunk a continuous series of keeled scales, some of which are larger than the rest. Throat and base of the gular sac with brown reticulated lines, enclosing round whitish spots; neck and the upper surface of the wings with a meshwork of similar lines, enclosing round greenish-white spots; the lower surface of the wings uniform whitish.

Note 2.—*Draco cornutus* (n. sp.), from Borneo, also is allied to *D. volans*. The length of the hind limb is contained 1.4 times in the distance of the axils of the limbs. Dorsal scales subequal in size, smaller than the middle upper labials, obscurely keeled; a spine-like tubercle above the hind part of the orbit, longer than broad at the base; both sexes with a very low nuchal crest; on each side of the back a more or less distinct series of rhombic, keeled, distant scales which are rather larger than the rest. Chin with a few reticulated greenish lines; gular sac uniform; a pair of black spots on the neck, before the shoulder. Ground-colour of the wing brownish in the male, light reddish in the female, with numerous round black spots in both sexes; margin of the wing black.

DRACO MACULATUS. (Plate XIII. fig. C.)

Dracunculus maculatus, Gray, *Lizards*, p. 236.

Draco maculatus, Cantor, *Mal. Rept.* p. 39.

The hind limb extends nearly to the axil of the fore limb, if laid forwards, its length being contained 1.1 times in the distance between the axils of the limbs. Nostrils lateral, directed outwards; tympanum scaly. Dorsal scales smaller than the upper labials, partly keeled; male with a very low and indistinct nuchal crest; the gular sac is very large, strongly compressed in front. On each side of the back a series of large, trihedral, distant scales. Throat with small brown dots. The upper surface of the wings with numerous whitish longitudinal stripes of scales, and with black rounded spots, of which one in the outer, anterior corner of the wing is generally the largest. The lower part of the wing uniform whitish, sometimes with an isolated black spot.

This is a truly continental species, having been found in different parts of the coast of Siam, at Pinang, and in Tenasserim. The figure given represents a male specimen from the former country.

DRACO DUSSUMIERI. (Plate XIII. fig. D.)

Draco dussumieri, Dum. & Bibr. iv. p. 456. Jerdon, *Journ. As. Soc. Beng.* xxii. p. 471.

The hind limb extends very nearly to the axil of the fore limb, if laid forwards. Nostrils directed upwards; tympanum naked. Dorsal scales rather smaller than the upper labials.

slightly keeled; a very prominent, horn-like, conical tubercle behind and above the posterior part of the orbit. Male with a very low and indistinct nuchal crest; gular sac very long and narrow; on each side of the back a series of small tubercular prominences, each being composed of several small scales. Throat with scattered, irregular brown spots. Ground-colour of the wings light; blackish violet reticulated lines occupy the middle and outer half of the wings, enclosing round light spots.

Jerdon observes that this Dragon is only found in the neighbourhood of forests of the west coast of the Peninsula of India, frequenting the cocoa-nut and betel-nut plantations in their vicinity. It is tolerably common in all Malabar, Cochin, and Travancore, but not known farther north than Malabar, being either unknown or very rare in Canara.

Figure D of Plate XIII. represents the head of a male.

DRACO QUINQUEFASCIATUS.

Draco quinquefasciatus, Gray, *Zool. Journ.* 1827, p. 219; *Ind. Zool.* c. fig.

The length of the hind limb is contained 1.1 times in the distance between the axils of the limbs. Nostrils directed upwards; tympanum scaly. Dorsal scales very small; an indistinct series of rather larger, distant, rhombic scales along each side of the trunk. No tubercle above the orbit. Male with a very low nuchal crest; gular sac very long and narrow, lanceolate. Body light reddish, dotted all over with brown; wings with five concentric black bands, each extending from the margin of one wing to that of the other, across the trunk. That portion of the bands which crosses the trunk is not black, only darker than the ground-colour.

Only one specimen is known of this species; it is said to be from Pinang, and 8 inches long, the tail measuring 4.

DRACO TÆNIPTERUS. (Plate XIII. fig. E.)

Draco tænipterus, Günth. *Proc. Zool. Soc.* 1861, April 23, p. 187.

The hind limb extends beyond the shoulder-joint, if laid forwards. Nostrils directed upwards; tympanum entirely scaleless. Dorsal scales smaller than the upper labial shields, keeled; an indistinct series of larger, distant scales along each side of the trunk. No tubercle above the orbit. Male with a very low nuchal crest; gular sac strongly compressed, of moderate breadth and length, covered with large smooth scales. Back greenish iridescent; wings with five arched, black bands, not extending to the margin of the wing; some of them are forked at the base, and all are continued across the back of the trunk, although they are there of a much fainter colour.

Only a single male specimen was obtained by Mouhot, at Chartaboum, on the coast of Siam; a second, young specimen came from the coast of Tenasserim.

Note.—In the synopsis of the species of Dragons we have mentioned two other new forms, of which we here subjoin short descriptions.

Draco bimaculatus.—The hind limbs extend on to the axil of the fore limb, if laid forwards. Nostrils directed outwards; tympanum entirely scaleless. Dorsal scales smaller than the upper labial shields, distinctly keeled; an interrupted row of larger rhombic scales along each side of the trunk, two scales always being together; no tubercle above the orbit. Male with a distinct nuchal crest; gular sac triangular, covered with minute scales. A large, round, deep-black spot behind each angle of the mouth; throat and base of the gular sac with short subreticulated blackish streaks. Wings greenish; above beautifully reticulated with blackish, and with about thirteen narrow longitudinal stripes of white scales; below with blackish spots, confluent into bands. Philippine Islands.

Draco rostratus.—This species has the snout less obtuse and somewhat more elongate than any of the other Dragons. The hind limb extends to the axil of the fore limb, if laid forwards. Nostrils directed outwards; tympanum scaly. The dorsal scales are as large as, or even larger than, the upper labial shields, and keeled; a series of larger scales runs along each side of the trunk. Male with a very distinct nuchal crest; gular sac triangular, compressed, covered with very small scales. Throat and basal half of the gular sac with brown dots; wings with irregular narrow longitudinal stripes of white scales, and with small, round brown spots; the lower side of the wing immaculate. Probably from Borneo.

OTOCRYPTIS, *Wieg.*

Tympanum hidden. Back and sides covered with small scales, which are regularly arranged; a few large ones scattered over the sides. Male with a low nuchal crest and with a large gular sac; no dorsal crest. Head without any prominent spines or appendages. Limbs exceedingly long; hind limb longer than the body. Scales on the lower part of the tail not elongate.

Only one species is known.

OTOCRYPTIS BIVITTATA.

Otocryptis bivittata, *Wieg.* *Isis*, 1831, p. 291.

Head tetrahedral, with a sharp canthus rostralis, and with the eyebrows somewhat raised; it is covered above with numerous keeled scales; one of them, situated above the nasal shield, is larger than the others; the bony part of the interorbital space is concave and finely granulated. Ten upper labial shields and as many lower labials. Occipital and nuchal regions rough, but without prominent tubercles. Nostril small, round. Throat covered with small keeled scales; no fold in front of the shoulder or at the throat: male with a very large gular appendage, extending backwards to the belly; it can be folded up like a fan, as in *Sitana*, but the scales with which it is covered are smaller and keeled. The female and the young have no such appendage.

The trunk is compressed in the male and rounded in the female; its back is covered with small keeled scales, larger than those on the sides, which are directed obliquely downwards; a few large scales are intermixed between the small ones; those on the belly rather larger than the dorsal, strongly keeled; preanals small. A very low crest on the neck is peculiar to the male. Tail long, scarcely compressed at the root; all its scales are keeled, and those on its lower side as broad as long, scarcely different from the others.

The limbs are exceedingly long, the hind limb extending far beyond the extremity of the snout, if laid forwards; the fourth hind toe is nearly twice as long as the third.

Brownish olive; male generally with a whitish band along each side of the back; six or seven brown cross bars on the middle of the back between the bands; legs and tail with brownish transverse bands. A brown band broadly edged with whitish between the orbits; throat and an oblique streak from the eye to the angle of the mouth white; gular sac immaculate; throat of the female sometimes brownish. Sometimes nearly uniform brownish olive.

This species, though local, does not appear to be scarce in Ceylon; Peters (Monatsber. Berl. Acad. 1860, p. 184) mentions its occurrence at Trincomalee, Hinida, Ratnapura, and on Adam's Peak. An adult male measures 10 inches, the tail measuring 7; the length of its hind leg is $3\frac{1}{2}$ inches. It is evidently a Tree Lizard.

LYRIOCEPHALUS, *Merr.*

Tympanum hidden. Back and sides covered with minute scales; several distant series of large scales along the trunk; a crest runs along the whole vertebral line; superciliary margins pointed behind. Gular appendage moderately developed. The adult with a globular hump on the nose.

Only one species is known.

LYRIOCEPHALUS SCUTATUS.

Lacerta scutata, *L. Syst. Nat.* i. p. 360.

Lyriocephalus margaritaceus, *Merr. Amph.* p. 49.

— *scutatus*, *Wagl. Amph.* p. 150. *Kelaart, Prodr. Faun. Zeyl.* i. p. 166.

— *macgregorii*, *Gray, Ind. Zool. c. fig.*

The hump on the nose is globular, covered with small shields; it appears to be present in both sexes, but in very young specimens it is entirely absent. Canthus rostralis sharp

and prominent, continued into the elevated eyebrows. Head covered above with very small shields, between which larger round ones are intermixed. Twelve upper and lower labials. Gular sac moderately developed. Neck, trunk, and tail with a crest formed by triangular, distant scales. Body covered with minute scales; three longitudinal rows of large, sub-quadrangular scales run along each side. Ventral scales small, rhombic, keeled. Tail compressed, with the subcaudals strongly keeled and truncated behind. The hind limbs extend to the shoulder, if laid forwards. Nearly uniform dark green above, paler below.

This species is a native of Ceylon; the assertion that it has been found in Southern India has not been proved by more recent investigations. It attains to the length of 15 inches, of which the tail takes one-half. Kelaart says that it is frequent in the Kandian provinces, and that it feeds chiefly on leaves and on coleopterous insects. In confinement boiled rice is freely taken. The female lays from three to four hard-shelled eggs, of about the size of sparrows' eggs.

CERATOPHORA, *Gray*.

Tympanum hidden. Scales of the upper parts of the trunk unequal in size; anterior part of the back with a rudimentary, or without any crest; superciliary margins not pointed behind. Gular sac not developed or absent. A pointed or scaly appendage on the nose, at least in the male sex.

Since the discovery of two other species which approach *Igriocephalus*, it has become a question whether it would not be better to unite *Ceratophora* with that genus. All these lizards come from the interior of Ceylon.

* Numerous small scales are intermixed between the large ones on the sides of the body; rostral appendage a single, pointed, horn-like scale: *C. stoddartii*, p. 129.

** Sides of the body covered with larger scales only; rostral appendage compressed, fleshy: *C. tenentii*, p. 130.

*** Scales on the body very small, with scattered larger ones; rostral appendage cylindrical, scaly, present in the male only: *C. aspera*, p. 131.

CERATOPHORA STODDARTII. (Plate XIII. figs. F, F', F'')

Ceratophora stoddartii, Gray, *Ind. Zool. c. fig.* Kelaart, *Prodr. Faun. Zeyl.* i. p. 165.

Head covered with very small, irregular shields; labial shields numerous; throat with longitudinal series of quadrangular scales; nostril small, lateral. A very low, dentated crest along the neck and front part of the trunk; scales on the back small and smooth,

those on the sides very large, irregularly shaped and arranged, intermixed with numerous smaller scales similar to those on the back; ventral scales small, smooth, or slightly keeled; præanal region covered with very small scales. Tail long, thin, tapering, compressed at the root, covered above with smooth rhombic scales, below with keeled ones which are more elongate. Limbs rather long, the hind limbs extending on to the cleft of the mouth, if laid forwards. Dark green, with dark-brown cross bands across the back, tail, and limbs; generally a whitish streak behind the orbit.

The horn on the snout is more developed in the adult males than in the females and in the young; it is half an inch long in the former, whilst it is reduced to half that length in the females, and even to a still smaller size in the young. This proves that it is an ornament, analogous to the appendages in gallinaceous birds, or to the horns of the *Cervidæ*, and that it is not for the purpose of facilitating the discovery of food among decayed wood, as has been supposed. It is a modified, flexible, pointed scale, usually white, but assuming a purplish colour, like the scales on the throat and lips, when the animal is excited. This lizard lives in the elevated parts of the island.

Figure F of Plate XIII. represents the head of an adult male, F' of an adult female, and F'' of an immature male.

CERATOPHORA TENNENTII.

Ceratophora tennentii, Günth. in *Tennent, Nat. Hist. Ceyl.* p. 281 (with a woodcut).

Head covered with very small, irregular shields; the appendage on the nose is fleshy, compressed, subovate, covered with very small transverse scales; labial shields numerous; throat with longitudinal series of quadrangular scales, and without a developed gular sac; the lower eyelid is scaly; nostril small, lateral. Nuchal crest very low; scales on the back smooth, and much smaller than those on the sides, which are arranged in regular oblique series, all being of equal size; ventral scales small, keeled; præanal region covered with very small scales. Tail long, thin, tapering, with smooth rhombic scales above and with keeled ones below. Limbs long, the hind limbs extending on to the eye, if laid forwards. Green, irregularly marbled with brownish. The young has well-defined markings: a brown band between the eyes; an oblique band from the eye to the angle of the mouth; a light band along each side of the back, with a vertebral series of dark-brown spots.

This species is likewise an inhabitant of Ceylon, but appears to be a very local species, as we have received it only in two collections. I have named it after Sir J. E. Tennent. Both the adult specimens which I have examined* are males, 10½ inches long, the tail

* Sir J. E. Tennent mentions that the typical specimens were sent by Dr. Kelaart from Ceylon; Kelaart certainly would not have left such a remarkable lizard undescribed if he had known it. These specimens were selected by myself for the British Museum from collections sent by Mr. Thwaites to Mr. Cuming.

measuring 7. In young specimens, the trunk of which is only 1 inch long, the rostral appendage is already very distinct; in its internal structure it is spongy, and apparently consists of an erectile tissue.

CERATOPHORA ASPERA. (Plate XIII. figs. G, G'.)

Head covered with very small, irregular shields, each of which is elevated into a small tubercle; a larger tubercle behind the superciliary edge, and another on each side of the occiput; occiput with a pair of low ridges, convergent anteriorly. Nasal appendage cylindrical, slender, covered with small, imbricate, strongly keeled scales; it is nearly half as long as the head in the male, but quite rudimentary in the female. Labial shields numerous; throat with small, strongly keeled scales, without appendage; no fold in front of the shoulder. Nostril small, lateral. Scales on the back and sides very small, with numerous, irregularly scattered, larger keeled scales; no crest whatever, but some of the larger scales form short angular series across the vertebral line, with their angles pointing backwards. Ventral scales strongly keeled; preanal region covered with very small scales. Tail of moderate length, not compressed, with all its scales keeled; those at its lower surface are scarcely longer than broad. Limbs rather long, the hind limbs extending to, or nearly to, the orbit, if laid forwards. Brownish, marbled with darker; a rhombic light-coloured spot on the sacral region. The brown spots on the fore leg are edged with white in the male.

I have examined a male and female of this extraordinary species, both apparently mature, but not longer than 3 inches, of which the tail measures one-half. The British Museum received them from Ceylon, from the same source as the *C. stoddartii* and *C. tennentii*; hence it is probable that it is also confined to the mountainous parts of the interior of the island.

Figure G of Plate XIII. represents the female in a position which we have observed in many Agamæ; figure G' the head of the male.

COPHOTIS, Peters.

Tympanum hidden. Back and sides covered with very large, imbricate, irregular scales subequal in size. A nuchal and dorsal crest. A small gular sac in both sexes. Male with only a very small tubercle behind the rostral shield.

Only one species is known, from Ceylon.

Cophotis ceylanica. (Plate XIII. fig. H.)*Cophotis ceylanica*, *Peters, Monatsber. Berl. Acad. Dec. 1861, p. 1103.*

Head tetrahedral, rather narrow, with the snout somewhat produced and pointed; body and tail compressed, the latter slightly prehensile. The upper surface of the head is covered with small, irregular, rather convex shields. Nose of the male with a small obtuse tubercle. Nine upper and eight lower labials; nostril lateral, situated in the hinder half of a small shield. Eye rather small, eyelid scaly. Longitudinal series of quadrangular scales on each side of the gular sac, which in both sexes is but little developed. Nuchal crest composed of three compressed triangular scales, not continuous with the dorsal crest. The dorsal crest is composed of about twelve similar, distant scales, which are much larger in the male than in the female. The upper parts of the trunk covered with very large imbricate scales, irregularly arranged, but with their points directed downwards and backwards; some of them are keeled. Ventral scales small, strongly keeled. The scales on the upper parts of the tail similar to the dorsal, those on its lower surface similar to the ventral scales, their keels being continuous. Limbs moderately developed; the hind limbs extend on to the shoulder, if laid forwards. Toes with non-carinated transverse scales below; the third and fourth hind toes are nearly equal in length. Fawn-coloured, with irregular broad brown cross bands; tail nearly white, with brown rings; a white spot in front of the nuchal crest and a white band running from the angle of the mouth to the shoulder are more distinct in the male than in the female. Jaws with a broad brown margin; throat white, with one or two oblique brown streaks on each side.

This species must be rare and very locally distributed in the island of Ceylon, as it has escaped the observation of Kelaart. Two beautiful specimens have lately been procured for the British Museum, male and female of nearly the same size, 6 inches long, the tail measuring $3\frac{1}{2}$ inches. It is evidently a Tree Lizard.

JAPALURA.

Japalura et Bianca, Gray.

Tympanum hidden. The upper parts covered with small, imbricate, keeled scales, between which larger ones are intermixed; dorsal crest low. Tail slightly compressed at its base. Throat with a small pouch in the male, and with a transverse fold. No rostral appendage. Ventral scales of moderate size, keeled; scales below the tail as broad as long.

The geographical distribution of this genus is very singular, one species being found in

the Himalayas, a second on the island of Formosa, and a third in one of the Loochoo Islands.

- * A white band along each side of the neck *J. variegata*, p. 133.
- ** A white band along each side of the body *J. swinhonis*, p. 133.
- *** Uniform greenish olive *J. polygonata*, p. 134.

JAPALURA VARIEGATA.

Biancia niger, Gray, in *Ann. & Mag. Nat. Hist.* xii. 1853, p. 387.

Japalura variegata, Gray, *ibid.*

Head covered with small, irregular, keeled shields above; canthus rostralis sharp; a small tubercle behind the superciliary edge; throat covered with small keeled scales; a series of small shields commences at the chin and runs backwards parallel to the lower labial shields. Tongue scarcely notched in front; two small canine teeth in each jaw; the upper with fifteen very small molars on each side, much smaller than those of the lower jaw, which are subconical and seventeen in number. A fold across the throat; male with a small gular pouch. Nape of the neck granular, with scattered larger tubercles. Both sexes with a nuchal crest, composed of triangular lobes; it is continued along the back as a slight serrated ridge, and gradually disappears on the anterior part of the tail. Trunk slightly compressed; the upper parts are covered with smallish, keeled scales, intermixed with larger ones, all having their points obliquely directed upwards. Ventral scales strongly keeled, of moderate size; there are about thirty-eight scales in a longitudinal series between fore and hind limb. All the scales of the tail are rhombic and keeled, those on its lower side being the largest. The hind limb extends to the eye, if laid forwards; toes with keeled scales below; the fourth hind toe is one-fourth longer than the third. Back with alternate brown or black and greyish or yellowish-white cross bands which ascend obliquely backwards; head above variegated with black; a light, black-edged cross band on the interorbital space. A white or yellow band along the upper lip; another irregular band along each side of the neck, confluent with one of the light cross bands. Gular sac black behind; tail with broad brown or black rings.

The colours, however, vary to a considerable extent in this species. A large female is almost wholly black above, variegated with yellow, all the larger scales being of the latter colour. The characteristic bands on the head and side of the neck are present.

This species is a native of Sikkim; it attains to a length of 12 inches, the tail taking two-thirds of it.

JAPALURA SWINHONIS. (Plate XIV. fig. B.)

This species has a very great resemblance to that from the Himalayas, and may be chiefly distinguished by its peculiar coloration.

A small tubercle behind the superciliary edge; ten upper labials; sides of the nape tubercular, one larger tubercle on each side of the commencement of the nuchal crest. Twelve very small molars on each side of the upper jaw, thirteen larger ones below; the latter are closely set and triangular. A fold of the skin before each shoulder, not extending across the throat. Dorsal crest low, extending on to the root of the tail, which is rather compressed; only the upper dorsal scales have their points directed upwards, those on the sides point straight backwards. Ventral scales strongly keeled; there are about thirty-eight in a longitudinal series between fore and hind limb. The hind limb extends to the eye, if laid forwards; the fourth hind toe is one-fifth longer than the third.

Brownish grey, a white band along each side of the back; back between the white bands with broad, angular, black cross bands, the points of which are directed backwards; these bands are separated from one another by narrow, angular, white cross streaks formed by the larger scales, which are intermixed between the small ones and of a white colour. The remainder brownish grey; head and sides subreticulated with brown; legs and tail with brown bands, the latter about fifteen in number.

Only one specimen was obtained at Formosa by Mr. Swinhoe, H.B.M. Consul at that place; it is 8 inches long, the tail measuring $5\frac{1}{2}$ inches.

JAPALURA POLYGONATA.

Diploderma polygonatum, *Hallowell, Proc. Acad. Nat. Sc. Philad.* 1860, p. 490.

This appears to be a third species of this genus, although its characters are not well pointed out; it is described as being uniform greenish olive above; eight dark-coloured bands on the tail; seven upper labials; no fold across the chest; neck slightly folded.

A single specimen was obtained on Amakarima Island (Loochoo); it is 7 inches 9 lines long, the tail measuring $5\frac{1}{2}$ inches.

SITANA, *Cuv.*

Limbs long, with five toes in front and with only four behind. Scales regularly arranged, keeled. Tympanum visible. Scarcely any crest on the neck; male with a very large gular appendage which can be folded up like a fan. Femoral pores none.

One of the most easily distinguished genera, having only four toes behind. Head tetradral, with the snout of moderate length; body slightly compressed; tail longish, rounded,

tapering. Head covered with small, keeled scales; labial shields numerous; a series of larger scales on each side of the chin. A pair of small canine teeth in each jaw; tongue elongate, not notched; nostril small, directed outwards, in a very small shield; eyelid scaly; tympanum smaller than the orbit. The male is provided with a very large, subtriangular gular appendage, which extends on to the belly; it is covered with large square scales regularly arranged; it can be folded up like a fan, and in this state it is scarcely visible. The female has no trace of this appendage.

Sitana is confined to Western India and to Ceylon; only two species are known:—

The hind feet extend to the orbit *S. pondiceriana*.
 The hind feet extend to or beyond the extremity of the snout . . . *S. minor*.

SITANA PONDICERIANA.

Sitana pondiceriana, Cuv. *Règne Anim.* *Dun. & Bibr.* iv. p. 437.

The fore limb does not extend on to the vent, if laid backwards; the hind limb reaches to the orbit, if laid forwards; the lower thigh is rather shorter than the foot (measured from the heel to the tip of the longest toe), the length of which is only three-fourths of the distance between the shoulder and hip joints. Brown, with a series of dark spots along the middle of the back, the spot on the neck being the darkest; a whitish band along each side of the back. Gular appendage tricoloured—blue, black, and red.

This species attains to a length of 8 inches, of which the tail takes 5 inches. It appears to inhabit more northern parts of India than the following.

SITANA MINOR. (Plate XIV. figs. A, A')

Sitana ponticeriana, *Jerd. Journ. As. Soc. Beng.* xxii. p. 473 (not Cuv.).

The fore limb extends beyond the vent, if laid backwards; the hind limb to or beyond the extremity of the snout, if laid forwards; the lower thigh is considerably shorter than the foot, the length of which is more than the distance between the shoulder and hip joints. Brownish, with a series of rhomboidal dark spots along the back, the spot on the neck being the darkest; a whitish line along each side of the back. Gular appendage tricoloured—blue, black, and red.

This new species is closely allied to the other, but readily distinguished by its proportionally much longer limbs,—the foot of a *S. minor*, the body of which measures 2 inches in length, being almost as long as that of a *S. pondiceriana*, the body of which is 3 inches long. Moreover it remains smaller, full-grown specimens measuring 7 inches, of which the tail takes

5 inches. It is found in the neighbourhood of Madras, where it appears to be common in fields and low copests, avoiding wooded districts. The gular appendage is equally developed in both species. Mr. Jerdon observes that the splendid colours of this appendage are only exhibited during the pairing-season. It is the common prey of many raptorial birds.

Kelaart (Prodrom. Faun. Zeyl. p. 164) mentions the occurrence of *S. pondiceriana* in Ceylon; but it is more probable that the Ceylonese *Sitana* is identical with the Madras species.

Figure A of Plate XIV. represents a full-grown male of the natural size, with the gular appendage expanded; figure A' the throat of the same animal, with the appendage folded up.

DILOPHYRUS, Gray.

Tympanum naked. Back and sides covered with equally minute granular scales; a very high nuchal and dorsal crest, the lobes of the crest being united by a membrane. Gular sac small. Tail compressed.

Only one species is known.

DILOPHYRUS GRANDIS.

Dilophyrus grandis, Gray, *Lizards*, p. 239. Cantor, *Mal. Rept.* p. 34. pl. 20.

Head tetrahedral, with a sharp canthus rostralis; body and tail compressed; limbs long. Head entirely covered with very small scales. The canthus rostralis is continued into the superciliary edge, and lined with a series of larger scales; the upper surface of the snout is concave. Nostril small, in the upper part of a subquadrangular shield. Twelve upper and as many lower labials; a series of small shields on each side of the chin. Upper jaw with two or three pairs of very small incisors in front, then follow one canine tooth and thirteen tricuspid molars on each side; lower jaw with two conical and twelve tricuspid teeth on each side. Tongue very slightly nicked in front. Eyelids entirely covered with granular scales; tympanum half as large as the orbit; an isolated tubercle, and an oblique series of three or four others above the tympanum. Gular sac small, with a transverse fold behind, extending upwards to the shoulder. Neck and body covered with minute granular scales; ventral scales small, smooth. The nuchal and dorsal crests are very high, and not continuous; they are formed of long lanceolate scales which are united by a membrane; the base of the crests is covered by two or three series of large pointed scales, all with their tips pointing upwards. The upper edge of the compressed tail is sharp and slightly serrated; subcaudals in two series, rather broader than long, truncated behind, strongly keeled; sides of the tail covered with small smooth scales. The hind leg extends beyond the orbit, if laid forwards; the

fourth hind toe is one-fourth longer than the third. Back with the crests brownish, head yellow; chin and throat with seven oblique blue streaks; tail with broad brown rings.

The typical specimens of this fine lizard are from Rangoon, and identical with the one described and figured by Cantor, which is now in the British Museum. It is $22\frac{1}{2}$ inches long, the tail measuring 16 inches. It was captured by Sir William Norris on the Pinang Hills, on the bank of a mountain stream, at an elevation of 2000 feet. It appeared slow in its movements and of general sluggish habits.

BRNCHOCELA, *Kaup.*

Tympanum naked. Back and sides covered with scales equal in size and regularly arranged, the tips of those on the sides being directed backwards and downwards. Head without appendages or prominent spines. Dorsal crest present, formed by non-united spines. Gular sac but slightly developed. Tail not compressed, the scales on its lower side being as broad as long. Femoral pores none.

The lizards of this genus are true Tree Lizards, of a more or less pure green colour; they are found chiefly in the Archipelago, but extend to the southern coasts of the continent, and several of the species belong to the most common lizards of the East Indies: they are not found in Ceylon. Their head is tetrahedral, not ornamented by prominent spines, but uniformly covered by small keeled scales. The nostril is small, round, lateral; the eye of moderate size, with a round pupil; the tympanum large. A pair of canine teeth above and below, between which are several smaller conical teeth; lateral teeth compressed, tricuspid. These lizards are insectivorous. Tongue large, oblong, entirely attached to the gullet, not notched in front. The scales on the upper parts of the trunk are of equal size, keeled, in some species rather small, in others rather large; they are regularly arranged, and their tips point backwards and downwards. A more or less developed crest commences on the neck, where it is always highest; it does not extend on the tail. The gular pouch is but little developed, but there is generally a distinct fold before each shoulder. Ventral scales keeled. Tail exceedingly long, not compressed, covered with keeled scales; those on its lower surface are the largest, not longer than broad. Limbs long; toes with bicarinated scales below.

Three species are known to occur on the Indian continent:—

- | | |
|---|---------------------------------|
| About forty scales in a transverse series between vertebral line and belly . . . | <i>B. cristatella</i> , p. 138. |
| About twenty scales in a transverse series; all the scales between tympanum and eye of equal size | <i>B. smaragdina</i> , p. 138. |
| About twenty scales in a transverse series; a series of larger scales from the eye to the tympanum. | <i>B. jubata</i> , p. 139. |

BRONCHOCELA CRISTATELLA. *The Gruning.*

- Agama cristatella*, Kuhl, *Beitr. Zool.* p. 108.
 — *gutturosa*, Merr. *Amph.* p. 51.
 — *moluccana*, Less. *Voy. Coqu. Rept.* pl. 1. fig. 2.
Bronchocele cristatella, Dum. & Bibr. iv. p. 395. *Cantor, Mal. Rept.* p. 30.

Scales of the sides small, there being about forty in one of the transverse series; ventral scales much larger, in fourteen longitudinal rows. A short series of three or four larger scales forms a continuation of the superciliary margin; no other large scale on the temple. Nuchal crest low, formed by triangular spines; it is not continued on the back, where the vertebral scales are scarcely prominent. The fourth hind toe is one-eighth longer than the third. Uniform grass-green.

This species is very common in the Malayan countries and in numerous islands of the East Indian Archipelago—Sumatra, Java, Amboyna, Celebes, Borneo, Booroo, Philippines, &c. It moves and leaps with great quickness among the branches of trees. Cantor saw the colours of these lizards change suddenly to grey, brownish or blackish, sometimes with orange spots or with indistinct black network; large, isolated, round black spots appeared on the head or back or round the tympanum. It attains to a length of 20 inches, the tail measuring 16 inches.

BRONCHOCELA SMARAGDINA.

Scales of the sides of moderate size, there being nineteen in one of the transverse series; ventral scales twice as large as those on the sides, in twelve longitudinal series. All the scales between the orbit and tympanum are of the same small size. Nuchal crest slightly indicated by a series of larger, scarcely prominent scales; back without any trace of a crest, the scales along its vertebral line not being larger than the others. Gular pouch none; sixteen series of scales across the throat, between the angles of the mouth. There is no fold of the skin before the shoulder, but the scales are considerably smaller than those of the throat. The hind leg extends beyond the extremity of the snout, if laid forwards; the fourth hind toe is one-fifth longer than the third. Above uniform beautiful emerald-green, below greenish white; both colours are separated by a yellow band, running along each side of the belly, extending over the hind part of the femur, and lost behind the root of the tail. This band has the same position as that which may be seen in many green Tree Snakes.

Two specimens have been collected by Mouhot in Gamboja; they are $16\frac{2}{3}$ inches long, the tail measuring 13 inches.

BRONCHOCELA JUBATA.

Bronchocelela jubata, *Dum. & Bibr.* iv. p. 397.

— *gutturosa*, *Gray, Lizards*, p. 241 (not *Merr.*).

Scales of moderate size, forming from fifty-two to fifty-six longitudinal series round the body; those of the sides smaller than those of the belly; a short series of rather larger scales continued from the superciliary margin, a second similar series from the middle of the eye to above the tympanum; no other large scale before the tympanum. Dorsal crest high on the neck, formed by contiguous pointed lobes, its base covered by scales. Green, generally with some yellow spots on the neck.

This species is common in Java; according to Bibron it occurs also in Pondicherry. It attains to a length of 21 inches, the tail measuring 16 inches.

CALOTES.

Calotes, sp., *Cuvier*.

Tympanum naked. Back and sides covered with scales equal in size and regularly arranged, the tips of those on the sides being directed backwards and upwards. Dorsal crest present, formed by non-united spines. Gular sac but slightly developed. Subcaudal scales as broad as long. Femoral pores none.

The lizards of this genus are closely allied to *Bronchocelela*; but whilst the latter are almost entirely confined to the Archipelago, the *Calotes* are found only on the continent, including Ceylon. As far as our present knowledge extends, the coast of Siam is the only country where both genera intermingle with each other. The chief structural difference between both is in the direction of the scales. They are true Tree Lizards, some having the tail rather compressed at the base. They feed on insects, on tender leaves, and on berries.

The following species are known:—

* *Two small groups of spines on each side of the neck.*

No fold in front of the shoulder	<i>C. versicolor</i> , p. 140.
A fold before the shoulder; scales on the sides much larger than those on the belly, not keeled	<i>C. nemoricola</i> , p. 141.
A fold before the shoulder; scales on the sides nearly twice as large as those on the belly, strongly keeled	<i>C. mystaceus</i> , p. 141.
A fold before the shoulder; scales on the sides nearly as large as those on the belly	<i>C. roulei</i> , p. 142.

**** Spines above the tympanum in a single continuous series.**

Scales between eye and tympanum small, of equal size *C. ophiomachus*, p. 142.
(*C. platyceps*, p. 143.)

A stripe of larger scales between eye and tympanum *C. nigrilabris*, p. 143.

***** Three small groups of spines on each side of the head.**

A fold before the shoulder *C. emma*, p. 144.

****** Two series of scales above each tympanum.**

Fifty-eight series of scales round the middle of the body *C. maria*, p. 144.

CALOTES VERSICOLOR. The Bloodsucker.

Agama versicolor, Doud. Rept. iii. p. 395. t. 44.

— tiedemanni, Kuhl, Beitr. Zool. p. 109. Kaup, Isis, 1827, p. 619. t. 8.

— vultuosa, Harl. Journ. Acad. Nat. Sc. Philad. iv. p. 296. t. 19.

Calotes versicolor, Dum. & Bibr. iv. p. 405. Gray, Lizards, p. 243. Kelaart, Prodr. Faun. Zeyl. i. p. 170. Blyth, Journ. As. Soc. Beng. xxii. p. 649. Jerdon, *ibid*, p. 470.

— viridis, Gray, Ann. & Mag. Nat. Hist. 1846, xviii. p. 429 (not Jerdon or Blyth).

— rouxi, Blyth, l. c. xxi. p. 354 (not D. & B.).

Two small groups of spines, perfectly separated from each other, above each tympanum*. Dorsal crest moderately elevated on the neck and anterior part of the trunk, extending on to the root of the tail in large individuals, and gradually disappearing on the middle of the trunk in younger ones. No fold in front of the shoulder, but the scales behind the lower jaw are much smaller than the others; gular sac not developed. From thirty-nine to forty-three series of scales round the middle of the trunk. The hind foot (measured from the heel to the extremity of the fourth toe) is not much longer than the head in the adult, whilst it is considerably longer in the young. The coloration is very variable, sometimes uniform brownish or greyish-olive or yellowish. Generally broad brown bands across the back, interrupted by a yellowish lateral band. Black streaks radiate from the eye, and some of them are continued over the throat, running obliquely backwards; belly frequently with greyish longitudinal stripes, one along the median line being the most distinct; young and half-grown specimens have a dark, black-edged band across the interorbital region.

The ground-colour is generally a light brownish olive, but the lizard can change it to bright red, to black, and to a mixture of both. This change is sometimes confined to the head, at other times diffused over the whole body and tail. A common state in which it may be seen (as stated by Mr. Jerdon) is, seated on a hedge or bush, with the tail and limbs black, head and neck yellow picked out with red, and the rest of the body red. Jerdon and Blyth agree that these bright, changeable colours are peculiar to the male during the breeding-season, which falls in the months of May and June.

Mouhot has collected in Siam one of those fine variations of colours, which, however, appear to be infinite. It has the usual cross streaks between the eyes and the radiating

* These spines are very small in specimens from Afghanistan, and a female from that country has no trace of them.

lines round the orbit; nearly the whole of the neck and anterior half of trunk are uniform brown; the posterior half and the sides are grey, reticulated with black, and with black ocelli on the side of the belly; tail with narrow black rings; belly with the usual brown longitudinal streaks, and mottled with grey.

This is one of the most common lizards, extending from Afghanistan over the whole continent of India to China; it is very common in Ceylon, not extending into the temperate zone of the Himalayas. Ceylonese specimens are generally somewhat larger; one of them measured 16 inches, the tail taking 11 inches. It is found in hedges and trees; it is known in Ceylon under the name of "Bloodsucker," a designation the origin of which cannot be satisfactorily traced; in the opinion of Kelaart, the name was given to it from the occasional reddish hue of the throat and neck. The female lays from five to sixteen soft oval eggs, about $\frac{3}{4}$ ths of an inch long, in hollows of trees, or in holes in the soil which they have burrowed, afterwards covering them up. The young appear in about eight or nine weeks. In a hot sunny day a solitary Bloodsucker may be seen on a twig or on a wall, basking in the sun, with mouth wide open. After a shower of rain numbers of them are seen to come down on the ground and pick up the larvæ and small insects which fall from the trees during the showers.

CALOTES NEMORICOLA.

Calotes nemoricola, Jerdon, *Journ. As. Soc. Beng.* xxii. p. 471.

One detached spine in front of three or two small ones on each side of the nape; a fold of the skin before the shoulder. Scales of the sides very large, not keeled; those of the abdomen much smaller, keeled. Dorsal crest extending only about one-third along the back; where the dorsal crest terminates, the scales of the ridge are pointed. The scales at the base of the tail above are of rather large size. Green.

These characters have been noted by Jerdon from a single specimen obtained near the foot of the Coonoor ghât of the Nilgherries. It was 18 inches long.

CALOTES MYSTACEUS.

Calotes mystaceus, Don. & Bibb. iv. p. 408. *Blyth*, in *Kelaart, Prodr. Faun. Zeyl.* i. App. p. 47.

Two groups of small spines above each tympanum; a series of scales, which are rather larger than those in the neighbourhood, runs from the eye to above the tympanum. A fold of the skin in front of the shoulder. Dorsal crest well developed: in adult males it is composed of long lanceolate lobes, which gradually become shorter behind, its continuation on the tail being a series of prominent spinous scales, which are rather larger than those in the lateral series. The crest is much lower in immature specimens. Scales on the sides of the body nearly twice as large as those on the belly; the middle of the body is surrounded by

about fifty longitudinal series of scales. The hind limb extends nearly to the tympanum, if laid forwards. Green, clouded with yellowish; a series of large round purplish-brown spots along each side of the back. Lips yellowish.

This species is found in the Birman Empire (Pegu), Siam, Mergui, and in Ceylon. We have received specimens from Gamboja and from Mergui. An old male measures nearly 24 inches, the tail taking 19 inches. The specimen in the Paris Museum is not full-grown.

CALOTES ROUXII.

Calotes rouxii, *Dum. & Bibr.* iv. p. 407.

Two small groups of spines, separated from each other, on each side of the neck. A fold in front of the shoulder. Tail compressed into a sharpish edge at its base, covered superiorly with very large pentagonal scales. Scales on the sides of the body nearly as large as those on the belly. Tail below with four longitudinal series of rhomboid, strongly keeled scales, each terminating in a point posteriorly. Brownish, uniform or spotted with black.

The exact locality whence this species has been obtained is not known, nor has the species ever been identified by more recent observers. Jerdon enumerates a *C. rouxii* in his list of the Reptiles of Southern India (*Journ. As. Soc. Beng.* xxii. p. 471); having seen a rough figure of this species in the collection of drawings in the possession of W. Elliott, Esq., I have come to the conclusion that this must be an undescribed species, having a pair of isolated spines immediately behind the orbit and a black fold of the skin before each shoulder. The male is represented as uniform blackish brown, with yellow head and neck; the female brown, with irregular dark cross bands. I propose for this species the name of *C. ellioti*.

Mr. Blyth also has a *C. rouxi* from Birma and Ceylon; but this determination is as incorrect as that by Mr. Jerdon, the lizard in question having a row of three or four spines above the tympanum (see *C. nigrilabris*).

CALOTES OPHIOMACHUS.

Lacerta calotes, *L. Syst. Nat.* i. p. 367.

Agama ophiomachus, *Merr. Amph.* p. 51.

Calotes ophiomachus, *Gray, Syn. Rept. in Griff. Anim. Kingd.* ix. p. 55. *Dum. & Bibr.* iv. p. 402.

Kelaart, Prodr. Faun. Zeyl. i. p. 169. *Tennent, Nat. Hist. Ceyl.* p. 276.

? *Calotes viridis*, *Kelaart, l. c.* p. 171 (not *Gray*).

A single series of spines descending obliquely backwards above the tympanum; the spines at either end of the series are longer than those in the middle; scales between eye and tympanum small, of equal size. Dorsal crest much elevated, extending on to the end of the trunk, gradually becoming lower behind; gular sac but slightly developed; a fold behind the lower jaw. About thirty-two series of scales round the middle of the trunk, twelve of

which belong to the belly. Dark green, with four or six narrow, vertical white bands on the body; they are edged with brown in young specimens; head lighter-coloured or red; tail with some white bands anteriorly, brown posteriorly, with darker rings. Generally some white streaks or spots on the limbs.

The native country of this species is Ceylon and the neighbouring parts of Southern India. According to Blyth it is also found in the Nicobar Islands. It attains to a length of 26 inches, the tail being four times as long as the body. It is not rare in the jungle. Kelaart says that when the animal is irritated or alarmed at the sight of an enemy, its head and part of its neck and the crest become of a blood-red colour. When lying in a passive state, the head is of a light-yellow colour. Sometimes parts of the head and neck put on a black colour.

Mr. Blyth mentions another species, from Khasya, which he compares with *C. ophiomachus* :—

Calotes platyceps (Blyth, in Kelaart, Prodr. Faun. Zeyl. i. Append. p. 46).—Head much flatter than in *C. ophiomachus*; the nuchal spines are less laterally compressed or widely flattened and more rigid, being scarcely at all expanded on their terminal half; a well-marked second sincipital crest above the ear, showing eight spines, the first three of which are short and the fifth longest. No black stripe through the eye.—Cherra Puuji.

CALOTES NIGRILABRIS. (Plate XIV. figs. D, D'.)

Calotes rouxii, Blyth, in Journ. As. Soc. Beng. xxii. p. 647 (not Dum. & Bibr.).
— *nigrilabris*, Peters, in Monatsber. Berl. Acad. 1860, p. 183.

A single uninterrupted series of from three to six spines above and behind the posterior part of the tympanum; scales between the eye and upper part of tympanum larger than the surrounding scales. Dorsal crest moderately developed, composed of slender pointed spines, gradually becoming lower posteriorly on the trunk, and continued on the tail as a series of prominent keels of the median row of scales. The scales round the basal portion of the tail are rather large, in thirteen series. Scales on the side of the body smaller than those of the belly, which, again, are much smaller than the gular scales. A fold in front of the shoulder. The middle of the body is surrounded by forty-six longitudinal series of scales, twelve of which belong to the belly. The hind leg extends on to the eye, if laid forwards. The ground-colour is beautiful green, but the ornamental colours vary :—

α. A male, 13½ inches long, is uniform green, with a broad black band along the lips to behind the tympanum; tail brownish green, with distant, yellowish, brown-edged ocelli. Another male, rather younger, differs in having the lips and temples green, variegated with black.

β. Females, from 10 to 12 inches long, are green, with a narrow brownish-red vertebral band, passing into the brown tail, which is ornamented with ocelli as in α. Lips green, like the rest of the head; a short white, black-edged streak behind the eye, not extending on to the tympanum.

γ. A female, 12 inches long, has the brown vertebral band and the tail of variety β, but the back is crossed by four angular yellow, black-edged streaks, the angles of which are directed backwards; a white, black-edged streak below the eye, nearly reaching the tympanum; lips green. Legs with narrow yellow, black-edged cross bands. Fold before the shoulder black.

δ. A young specimen, 6 inches long, is green, with the black-edged cross bands of variety γ, but of a white colour; tail with whitish ocelli.

This species is by no means very rare in Ceylon; it is found in the environs of Newera Ellia. It was well known to Blyth, who gave a good description of varieties α and β, but mistook it for *C. roulei*. The description and the name given by Peters are applicable to variety α only.

Figure D of Plate XIV. represents a female of variety γ, D' the head of a male, variety α: both figures of the natural size.

CALOTES EMMA.

Calotes emma, Gray, *Lizards*, p. 244. *Blyth, Journ. As. Soc. Beng.* xxii. p. 647.

Three small groups of spines, completely separate from each other, on each side of the head—one behind the superciliary margin and two above each tympanum. Dorsal crest well developed on the neck and on the anterior part of the trunk, gradually disappearing behind. A transverse fold in front of each shoulder; gular sac but little developed. Tail compressed. About fifty-one series of scales round the middle of the trunk. Brownish olive, with brown bands across the back, which are lighter in the middle and interrupted by a white band running along each side of the back; eyelids with short, radiating brown streaks; a brown band from behind the eye to above the tympanum; fold before the shoulder black, with an irregular white margin; legs and tail with indistinct dark cross bands.

An inhabitant of Mergui, whence we have received it from Professor Oldham, ranging northwards perhaps to the Khasya Hills; extremely doubtful as an inhabitant of Afghanistan. It attains to a length of 11 inches, the tail measuring 8 inches. Mr. Blyth mentions it amongst a collection made by Captain Bedmore at Schwe Gyen on the Sitang River in Pegu.

CALOTES MARIA.

Calotes maris, Gray, *Lizards*, p. 243.

?*Calotes tricarinatus*, Blyth, *Journ. As. Soc. Beng.* xxii. p. 650.

Two series of larger scales, more or less prominent and spine-like according to age, above the tympanum, the upper being continuous with the superciliary ridge. Dorsal crest elevated only on the neck and on the anterior part of the trunk; gular sac not developed; male with a fold in front of the shoulder. About fifty-eight series of scales round the

middle of the trunk. Uniform green; elbow and heel with a yellowish-white spot; sometimes a light band edged with black along each side of the back.

We have received specimens of this lizard from the Khasya Hills, and from Jamu, Himalayas, where it is found at an elevation of about 3000 feet. It attains to a length of 16 inches, the tail measuring 12. Its occurrence in Afghanistan is more than doubtful.

SALEA, *Gray*.

Tympanum naked. Back and sides covered with strongly keeled scales of moderate size; several larger scales are intermixed with the others on the side; the scales form longitudinal series, and their tips are directed backwards; head without any spines. A crest on the back; gular sac none. Tail slightly compressed at the base, with keeled scales below, which are almost as broad as long.

The head is tetrahedral, covered with small irregular shields above, which are nearly as large as the labials. Nostrils lateral, in the hinder part of a small shield. Canthus rostralis very distinct; superciliary edge not prominent; eye of moderate size; tympanum as large as the eye. The trunk is slightly compressed, and covered with scales of moderate size which are sharply keeled and acutely pointed, the keels forming continuous longitudinal lines; the ventral and gular scales are similar in shape and size to those on the sides. There are three larger scales, separate from one another, and placed in the same longitudinal line somewhat below the middle of the sides. Throat without pouch or fold; dorsal crest more or less developed. Tail long, tapering, slightly compressed at the base, uniformly covered with rhombic keeled scales, those at its lower side having very strong keels. The limbs are well developed; the fourth hind toe is not much longer than the third.

Only one species is known.

SALEA HORSFIELDII.

Salea horsfieldii, *Gray*, *Lizards*, p. 242 (female).

— *jerdonii*, *Gray*, *Ann. & Mag. Nat. Hist.* xviii. 1846, p. 429 (male). *Jerdon*, *Journ. As. Soc. Beng.* xxii. p. 473. *Kelaart*, *Prodr. Faun. Zeyl.* p. 167.

Mecolepis trispinosus, *Duméril*, *Arch. Mus. Hist. Nat.* viii. 1856, p. 564. pl. 24. fig. 1 (adult male = *S. jerdonii*, *Gray*).

— *hirsutus*, *Duméril*, *l. c.* fig. 2 (immature male).

— *sulcatus*, *Duméril*, *l. c.* fig. 3 (female = *S. horsfieldii*). In these three figures the larger scales have been omitted; the colours are represented from preserved specimens.

A series of scales between orbit and tympanum rather larger than the others on the side

v

of the neck. The hind leg extends to, or nearly to, the angle of the mouth, if laid forwards. The middle of the trunk is surrounded by about thirty-eight series of scales. Dorsal crest high in the adult male, composed of long, closely-set, lanceolate spines, a nuchal portion being separated from the dorsal portion by a very short interspace; it extends on to the tail; it is much less developed in immature males in its altitudinal and longitudinal extent, and remains rudimentary in the female sex. An irregular black band, edged below with white, is most distinct between the orbit and the tympanum; it is interrupted behind the ear and reappears before the shoulder-joint. The back is ornamented with irregular white and black cross bands—many white scales having a dark margin, and the black ones a red longitudinal streak. The isolated large scales are white. Head with red and white dots above; spines of the dorsal crest partly black and partly red; legs with bands similar to those of the back; tail with broad brown rings. The females have less bright colours; and the young ones broad brown bands across the back, between a pair of indistinct light longitudinal bands running along the sides of the back.

This description of the colours is taken from drawings of living specimens in the possession of Walter Elliott, Esq. The coloration, however, appears to be very variable: Jerdon describes it as a bright grass-green marbled with brown, with some red marks on the head and nape and with a few white scales on the sides. The colours become darker at a low temperature, as is the case with many tropical lizards.

This is the only species known, the *S. gularis* of Blyth* evidently belonging to a different genus. It is found in the Nilgherries and at Newera Ellia in Ceylon, where it frequents bushes and hedges. The statement of its occurrence in Afghanistan depends on a label found with the typical specimens in the former collection of the East India Company. It attains to a length of 15 inches, the tail measuring 11 inches.

ORIOCALOTES.

Tympanum naked. Back and sides covered with scales of moderate size, between which larger ones are intermixed; their tips are directed backwards and upwards; a spine behind the superciliary edge. Dorsal crest present, formed by non-united spines, less distinct in the female than in the male. Gular sac none. Tail rounded, with keeled scales below, which are as broad as long.

Only one species is known.

* Journ. As. Soc. Beng. xxii. p. 473.

ORIICALOTES MINOR.

Calotes minor, Gray, *Lizards*, p. 244.

This lizard has quite the appearance of a *Calotes*; its head is covered above with small obtusely keeled shields, some on the superciliaries and on the occiput being larger than the rest. The canthus rostralis and the superciliary margin are but slightly prominent, and there is a small spine behind the latter; neck and temples tubercular; two groups of spines above each tympanum; throat covered with small keeled scales; a fold of the skin before each shoulder. Trunk but slightly compressed; a low crest, composed of triangular spines, commences on the neck and is visible as a serrated ridge to the end of the trunk. The middle of the trunk is surrounded by forty-eight or fifty series of scales; those on the sides are as large as those on the belly, but several very large ones are intermixed between the smaller ones on the sides; tail covered with keeled scales equal in size and form. The hind limbs extend beyond the tympanum, if laid forwards; the fourth hind toe is but little longer than the third. Greyish olive, marbled with brown, the brown spots being sometimes band-like between the eyes, on the limbs, and across the base of the tail. Brown streaks radiate from the orbit.

Some of the specimens received from the East India Company were marked as coming from Afghanistan, and others from Khasya; it is probable, however, that they were all from the latter country. Messrs. v. Schlagintweit found this lizard in Sikkim. It is a small species, attaining to the length of 7 inches, the tail taking $4\frac{1}{2}$ inches.

ACANTHOSAURA, Gray.

Tympanum naked. Back and sides covered with very small scales, between which, generally, larger keeled ones are scattered; a free spine behind the superciliary edge. Dorsal crest present, formed by non-united spines. Gular sac none. Tail slightly compressed at the base, with keeled scales below, which are longer than broad.

The three species known are confined to the continent, as far as our present knowledge extends.

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|--|---------------------|
| A long spine on each side of the neck; orbital edge not serrated | <i>A. armata.</i> |
| No spine on the side of the neck | <i>A. capra.</i> |
| A short spine on each side of the neck; orbital edge serrated | <i>A. coronata.</i> |

ACANTHOSAURA ARMATA.

Agama armata, Gray, *Zool. Journ.* 1827, iii. p. 216.

Acanthosaura armata, Gray, *Lizards*, p. 240.

Lophyrus armatus, Dum. & Bibr. iv. p. 413. Cantor, *Mal. Rept.* p. 32.

Body covered with small, rough, granular scales; larger scales, each terminating in a small spine, are scattered all over the back: a crest, slightly interrupted on the neck, extends from the occiput to the root of the tail; it is composed of spines, which are long, pointed on the neck and on the anterior part of the back, and short and triangular posteriorly; two or three series of shorter spines cover the base of the crest. The upper orbital edge is prominent, sharp; there is a long spine, surrounded by smaller ones, above the hinder angle of the orbit; a similar spine with smaller ones at its base on each side of the neck above the tympanum. Tympanum as large as the eye. Gular sac none; a fold before each shoulder, not extending across the throat. Ventral scales keeled; twenty or twenty-two longitudinal series across the breast between the axils. The scales in the præanal region are generally rather larger than those of the belly. Tail but slightly compressed, with all the scales keeled; those on its lower surface are longer than broad, very strongly keeled, each keel terminating in a small spine. Limbs of moderate length; the hind limb extends to the temple, if laid forwards. Toes with keeled scales below; the fourth toe (measured from the heel) is as long as, or only a little longer than, the head; the third is one-fourth shorter. Greenish brown, with roundish lighter spots; five or six black lines radiate from the orbit over the lip. Sometimes light-coloured, with irregular dark-brown spots.

This species is found at Singapore, Pinang, on the coasts of Tenasserim and Siam (Chartaboun), and in Cochinchina, but does not appear to be numerous. We have examined specimens $12\frac{1}{2}$ inches long, the tail taking 7. Dr. Cantor observes that two live specimens (which are now in the British Museum) were very active and fierce, possessed in a slight degree the power of changing the ground-colour, and refused food and water. In a female were found thirteen eggs, of an oval shape, $\frac{3}{4}$ ths of an inch long. The stomach contained fragments of leaves and twigs.

ACANTHOSAURA CAPRA. (Plate XIV. fig. F.)

Acanthosaura capra, Günth. *Proc. Zool. Soc.* 1861, April 23, p. 188.

Back and sides covered with small but imbricate smooth scales, which become gradually somewhat larger and more distinctly keeled towards the belly; no large scales intermixed with the small ones, only a few appearing to be a little larger than the rest. Nuchal crest separated from the dorsal crest by a small interspace; the former is composed of long, pointed, compressed spines; the latter of triangular scales, which are of moderate size anteriorly, becoming smaller behind. The upper orbital edge is rather prominent, terminating in a long spine behind, with some small spines at its base. No spine on the side of the neck. Tympanum smaller than the eye. Throat expansible, without appendage; a short fold before

each shoulder. Ventral scales small, strongly keeled; twenty-four longitudinal series across the breast, between the axils. The scales in the præanal region not larger than those of the belly. Tail slightly compressed at the base, with all the scales keeled; those on its lower surface are longer than broad, very strongly keeled, each keel terminating in a small spine. Limbs of moderate length; the hind limb extends to the temple, if laid forwards. Toes with keeled scales below; the fourth toe (measured from the heel) is as long as the head; the third is one-third shorter. Greenish brown, with indistinct, roundish light spots; throat of the adult blackish brown, with an orange-coloured streak along the middle.

Two specimens were collected by Mouhot, at Chartaboum, on the coast of Siam; the larger is 13 inches long, the tail measuring 8; the other is only half that size, and has the post-orbital spine and the nuchal crest well developed, though comparatively lower.

ACANTHOSAURA CORONATA. (Plate XIV. fig. E.)

Acanthosaura coronata, Günth. *Proc. Zool. Soc.* 1861, April 23, p. 187.

Back and sides covered with small, imbricate, smooth scales, the tips of which are slightly turned towards the dorsal line; larger keeled scales are scattered between the small ones. A low crest formed by triangular scales runs from the nape to the root of the tail, where it is very indistinct. The supraorbital edge is very prominent, sharp, serrated behind; a very short conical spine behind the supraorbital edge, separated from it by a deep incision. Another short spine on each side of the neck, midway between the tympanum and nuchal crest. Tympanum nearly as large as the eye. No gular sac; an oblique fold before each shoulder, not extending across the throat. Ventral scales keeled; eighteen longitudinal series across the breast, between the axils; præanal scales not larger than ventrals. Tail slightly compressed at the base, with all the scales keeled; those on its lower surface are longer than broad and very strongly keeled. Limbs of moderate length; the hind limb extends to the eye, if laid forwards. Toes with keeled scales below; the fourth toe (measured from the heel) is as long as, or shorter than, the head; the third is one-third shorter. The ground-colour of the male is grey, of the female brownish red; irregular dark-brown bands across the back and the legs. A yellowish-olive band edged with black across the crown, from one superciliary edge to the other; an oblique, short yellow band, broadly edged with brown, from below the orbit to the angle of the mouth. Four short brown streaks radiate from the upper eyelid over the lower surface of the prominent superciliary edge.

Several specimens have been collected at Chartaboum together with *A. armata* and *A. capra*. An adult pregnant female is 7 inches long, of which one-half is taken by the tail; we have figured it on Plate XIV.

ORIOTIARIS.

Tympanum naked. Back and sides covered with very small scales, between which larger keeled ones are scattered; a tubercle behind the superciliary edge. Dorsal crest very low, formed by a series of larger, keeled, not prominent scales. Gular sac none. Tail not compressed, with keeled scales below, which are almost as broad as long.

Only one species is known.

ORIOTIARIS ELLIOTTI.

Tiaris ellioti, Günth. *Proc. Zool. Soc.* 1860, p. 151. pl. 25. fig. B.

The head is rather high, with a sharp canthus rostralis, short snout, and convex upper eyelids; it is covered with numerous slightly keeled scales, and one situated in the middle of the occiput appears to be rather larger than the others; the width of the space between the bony orbits is very narrow; the canthus rostralis and the margin of the upper eyelid form one continuous sharp edge. The rostral shield is very low, like the upper labials, which are five in number. The nostril is very small, in a single shield, which is situated between the canthus rostralis and the first labial. The loreal region is a little concave, and covered with small irregular shields. The median shield of the lower jaw is subtriangular and longer than broad; there are five lower labials on each side, the remainder of the throat being covered with imbricate and keeled scales. There is a small conical tubercle behind, and detached from, the orbital edge; and another similar tubercle on each side of the throat below the tympanum; a series of tubercles proceeds from above the tympanum, and is bent inwards to the nuchal ridge. The tympanum itself is small and subcircular. There is no fold across the throat, but a transverse band of rather smaller scales.

The trunk is rounded, in the female depressed; a series of larger, keeled scales runs along the middle of the neck and back to the base of the tail, and forms a sort of dorsal crest; the back and the sides are covered with small scales of unequal size and quite irregularly arranged; they are intermixed with scattered, considerably larger scales, which are distinctly keeled. The scales of the belly are imbricate, rhombic, more equal in size and more regularly arranged and slightly keeled; the preanal are like those of the belly; preanal pores none.

The tail is very long, slender, rounded at the base, and covered on all sides with rhombic, keeled, imbricate scales; it is not verticillated.

The upper parts of the extremities are covered with very large and strongly keeled scales: some scales on the hinder side of the femur have even two or three keels. The fore leg

reaches to the loin, if laid backwards; the hind leg, if laid forwards, nearly to the end of the snout. The fourth hind toe is one-fourth longer than the third.

The ground-colour of the upper parts is brownish; uniform in the females, variegated with darker in the males. Some of the large scales of the back appear to have been iridescent during life. The lower parts are uniform dull yellowish.

This species attains to a length of nearly 7 inches, the tail measuring $4\frac{1}{2}$. It inhabits the Sikkim parts of the Himalayas, and has been obtained at an altitude of 9200 feet.

TIARIS.

Tiaris, (Dum. & Bibr.) Gray, *Lizards*, p. 239.

Tympanum naked. Back and sides covered with small imbricate scales with scattered larger ones; no spine behind the superciliary margin. Dorsal crest present, formed by non-united spines; gular sac present, at least in the males. A fold before the shoulder. Femoral pores none.

Species from New Guinea and from the Philippine Islands have been referred to this genus. Mr. Blyth considers a lizard from the Andaman Islands also as belonging to it.

TIARA SUBCRISTATA (Blyth, Journ. As. Soc. Beng. xxix. p. 109).—A low nuchal crest, and merely a slight serrated ridge along the back; gular pouch in the males only, covered with small smooth scales of equal size; ventral scales keeled; those of the upper parts minute, arranged in irregular transverse series, their keels presenting a tuberculated appearance except towards the ridge of the back: a row of about ten large tubercles on each side, commencing from the occiput. Colours various, the young being much speckled and reticulated with greyish black; the full-grown mostly plain, with dark bands on the tail more or less distinct. Length 12 inches, of which the tail is $8\frac{1}{2}$ inches. Common at Port Blair.

PHYSIGNATHUS, *Cuv.*

Tympanum naked; the upper parts covered with minute granular scales of equal size, arranged in transverse series; throat tubercular; ventral scales smooth; head without any spines. A crest on the back and tail; a fold across the throat. Tail compressed, covered with keeled scales, those at its lower side rather broader than long, strongly keeled. A series of pores on the inner side of the femur.

Head tetrahedral, covered above with minute granular scales, with some larger scales along the canthus rostralis; snout obtuse; nostril lateral, in the middle of a small shield; eyebrows not prominent; eyes of moderate size; eyelid scaly. Teeth compressed, triangular; a pair of small canine teeth in each jaw. Tongue slightly notched. Labial shields numerous; a series of shields along each side of the throat; skin of the throat lax, covered with tubercular scales; the tubercles on the side of the throat are unequal in size, larger ones being mixed between smaller ones, and three or four in the middle between angle of the mouth and shoulder being the largest, conically prominent. A fold across the throat, none before the shoulder. Trunk of the adult compressed, and elevated into a sharp ridge; the body of the young is more rounded. The scales are uniformly small, granular, disposed in transverse series. Adult specimens with a crest, composed of more or less elongate lobes according to the age of the individual; the crest is more or less distinctly interrupted above the fore and hind legs. Belly covered with small, smooth, rhombic scales. The tail is very long, and strongly compressed; the crest of the back is continued for some distance, and gradually passes into a double, minutely serrated ridge; the sides of the tail are covered with keeled rhombic scales, smaller than those at its lower surface, where they are strongly keeled. Legs rather long; the hind toes are slightly fringed along the outer edge; the scales at their lower side are not keeled.

The lizards of this genus attain to a larger size than the other Indian *Agamidae*, and approach the *Iguanidae* in general habit. Nothing is known of their habits.

Only two species are known:—

Six or seven intralabial shields	<i>Ph. cochinchinensis.</i>
Eleven intralabial shields	<i>Ph. mentager.</i>

PHYSIGNATHUS COCHINCHINENSIS.

Physignathus cocincinus, *Cuv. Règne Anim.*

Lophura euvieri, *Gray, in Griff. Anim. Kingd. ix., Syn. Rept. p. 60.*

— *concinna*, *Gray, l. c. p. 61.*

Istiurus physignathus, *Dum. & Bibr. iv. p. 387.*

An occipital shield is present, flat and subcircular; thirty-six molar teeth in each jaw; a series of six or seven shields along each side of the throat. Greenish olive: tail with brown cross bands.

This species, which we have not seen, is from Cochinchina. A specimen in the Paris Museum is 28 inches long, the mutilated tail taking 17 inches.

PHYSIGNATHUS MENTAGER. (Plate XV.)

Dilophyrus mentager, *Günth. Proc. Zool. Soc. 1861, p. 188.*

Occipital shield very small, one-third of the size of the tympanum, circular; eleven molar teeth on each side of the upper jaw, and twelve in the lower; a series of eleven shields along each side of the throat. Five or six pores on the inner side of the femur. Green: tail with brown cross bands.

A specimen of this species was sent by Mouhot from Chartaboum, on the coast of Siam; it is stuffed, 30 inches long, the tail measuring 21 inches. In a second specimen, sent by the same collector from Pachebone, and preserved in spirits, I was enabled to ascertain that femoral pores are present, and consequently that this species does not belong to the genus *Dilophyrus*. The longest lobes of the dorsal crest are as long as the inner front toe in the adult specimen, whilst they are only half as long in the other, which is 21 inches long.

LIOLEPIS, *Cuv.*

Tympanum naked; the upper parts covered with minute granular scales of equal size; tail depressed, with very small, square, keeled scales arranged in transverse series; throat with two transverse folds; no dorsal crest; ventral scales small, smooth. Femoral pores. Skin of the sides of the trunk very lax, capable of being expanded into a sort of wing, supported by the very long anterior spurious ribs.

Only one species is known.

LEIOLEPIS GUTTATUS.

Leiolepis guttatus, Cuv. *Règne Anim. Dum. & Bibr.* iv. p. 465. pl. 43. fig. 1.

Uromastix belliana, Gray, *Ind. Zool.* c. fig.

Leiolepis reevesii, Gray, *Lizards*, p. 263. Cantor, *Mal. Rept.* p. 44.

— *bellii*, Gray, *Lizards*, p. 263. Cantor, *Mal. Rept.* p. 41.

Head tetrahedral, with a distinct canthus rostralis; body and tail depressed; legs strong. Snout covered above with keeled scales, the remainder of the upper and lateral parts of the head being granular. Rostral and mental shields large, the latter pentagonal, much longer than broad. Throat granulated, with two transverse folds extending upwards to the side of the neck; a series of small shields commences at the chin, runs backwards along each side of the throat, and is separated from the labials by smaller shields. Nostril lateral, ovate; eye of moderate size, with the eyelids scaly; tympanum as large as the eye, ovate in its vertical diameter. Trunk depressed, with a lateral fold of the skin; it is covered with minute granular scales above, each scale being raised into a conical tubercle; ventral scales small, smooth, rhombic. Tail depressed, long, tapering, covered with very small keeled scales arranged in cross rings; the scales are smallest in the middle of the upper surface, and largest below. Limbs strong; the hind limb extending nearly to the tympanum, if laid forwards; toes with keeled scales below, armed with strong claws, those of the fore toes being much longer than those of the hind toes; the third hind toe is one-third shorter than the fourth. Each femur with a series of from thirteen to nineteen pores, not extending into the preanal region; each pore is in a separate scale.

Blackish grey above, with series of yellow, black-edged spots; some of the spots are confluent, entirely black, forming irregular longitudinal bands: in Chinese specimens the spots are not confluent, forming regular ocelli (*L. reevesii*). The expanded membrane black, with seven or eight broad transverse bands of a brilliant orange. The tail above with numerous small pale-yellow spots; fore legs with rounded orange-coloured spots; hind legs dotted with yellow. Throat pale azure; belly pale orange, reticulated with blue; lower eyelid pure white.

For a more intimate knowledge of this lizard we are indebted to Cantor, who had the opportunity of observing living specimens, and who discovered the presence of an expandible wing-membrane. "In a state of repose it appears like a longitudinal loose fold; expanded the external margin becomes arched, the trunk and the membranes forming a greatly flattened oval disk, resembling the hood of *Naja*. Like the mechanism of the genus *Draco*, the membranes are expanded by means of the very long six anterior pairs of spurious ribs, which the lizard has the power of moving forward at a right angle with the vertebral column. The wings are used as a parachute in leaping from branch to branch, after which they immediately resume their state of repose. Sudden fear or anger will also cause a momentary expansion. The specimens which were obtained from a spice plantation in the province Wellesley were active and swift, more so than their rather heavy make would induce one to believe, and they would bite and scratch when handled, although among themselves, in a spacious cage, they appeared peaceable. They were fed with soft fruit and boiled rice."

I have seen specimens from the Malayan Peninsula, from Mergui, from Gamboja, and from China. One of the largest measured 19 inches, the tail taking 13 inches.

UROMASTIX, *Merrem.*

Tympanum naked; the upper parts covered with minute granular scales of equal size; tail depressed, surrounded by rings of spinous tubercles, not extending on its lower side; throat with a transverse fold; no dorsal crest; ventral scales small, smooth. Femoral and præanal pores.

Only one species is known from India, the others belonging to the North-African fauna. Inhabitants of rocky parts of plains.

UROMASTIX HARDWICKII.

Uromastix hardwickii, Gray, *Zool. Journ.* iii. p. 219; *Illustr. Ind. Zool.* c. tab.

— reticulatus, Cuv. *Règne Anim.*

Saara hardwickii, Gray, *Lizards*, p. 262.

Head short, obtuse; body and tail depressed; legs stout. Snout covered above with small shields, the remainder of the head being finely granular, with the exception of a few larger tubercles between the orbit and the tympanum; canthus rostralis indistinct, bent downwards over the nostril; labial shields very small, the hinder of the upper lip being triangular lobes; a series of larger scales along each side of the throat, separated from the lower labials by a granular interspace. Nostril lateral; eye rather small, eyelids scaly; tympanum deeply sunk, larger than the eye, ovate in the perpendicular direction, fringed with small tubercles in front. Skin of the throat very lax, folded. The tail is depressed, very thick anteriorly, tapering behind, divided into numerous rings, each with a transverse series of small spinous shields; the interspaces between these series are finely granular. The lower part of the tail is smooth, covered with small scales, which are rather larger than those of the belly; the shields of the upper parts are visible also below, but they do not reach across the tail, and only those on the hind part of the tail are keeled. The legs are stout, and armed with strong claws; the fore leg is covered with small smooth scales. Femur with smooth imbricate scales in front, and with a few small tubercles above; the lower hind leg with several conical tubercles of unequal size. The hind leg does not extend on to the axil, if laid forwards. Toes rather short, with keeled scales below; the fourth hind toe is one-third longer than the third. A series of eighteen pores extends from the end of the femur to the middle of the præanal region; it is curved, and not continuous with that of the other side; each pore is surrounded by several small scales.

Lighter or darker yellowish grey, or greyish olive, uniform, or clouded, or with wavy blackish transverse lines; sometimes a large black spot on the inner side of the femur.

This lizard inhabits the plains of Hindostan; we have seen specimens from Kanouge, from Kurrachee, and from Goojerat; it is not found in Bengal. It attains to a length of 13 inches, the tail measuring $5\frac{1}{2}$ inches.

CHARASIA, *Gray.*

Tympanum naked. Body depressed, covered with small, imbricate, keeled scales equal in size, and regularly arranged in transverse series: tail slightly compressed, with cross rows of small, keeled scales; those at its lower side small, truncated. Throat with a cross fold; no gular sac; a low dorsal crest; ventral scales small, smooth. Femoral or præanal pores none.

Only one species is known.

CHARASIA DORSALIS.

Agama dorsalis, *Gray, Syn. Rept. in Griff. Anim. Kingd.* p. 56. *Dum. & Bibr.* iv. p. 486. *Jerdon, Journ. As. Soc. Beng.* xii. p. 475.

Charasia dorsalis, *Gray, Lizards*, p. 246.

Head depressed, oblong, triangular; body depressed; tail slightly compressed, tapering, of moderate length. The upper parts of the head are covered with very small flat shields; only those along the canthus rostralis, which is rather sharp, are larger than the rest. Throat covered with very small smooth scales; a series of five larger scales along each side of the chin, separated from the lower labials; the median lower labial is elongate, triangular, pointed behind. Teeth small, triangular; tongue slightly notched in front. Tympanum as large as the eye; two groups of small spines above each tympanum. The scales on the back and sides are regularly arranged in transverse series, slightly keeled, with the points directed obliquely upwards; the middle of the body is surrounded by about 130 series of scales. The dorsal crest is very low, slightly prominent on the neck, and continued as a series of strongly keeled, prominent scales along the back and anterior part of the tail. Præanal scales not different from those of the belly. The scales on the tail are similar to those on the trunk, but rather larger, and the scales at its lower side are obtusely rounded or subtruncated behind. Legs strong; the hind leg extends beyond the tympanum, if laid forwards: the toes are armed with claws of moderate strength; the fourth hind toe is one-fifth longer than the third. The colour is brownish yellow or dusky grey on the back; a black band commences behind the eye, and another behind the angle of the mouth; the former is continued on, and spreads over the sides of the body; legs dotted with black. The male is sometimes of a brighter colour—red or yellow on the back, black on the sides and on the belly.

This is a rock lizard, and, according to Mr. Jerdon, it is partially distributed in Southern India, and only found at some elevation above the sea. It is most abundant in Mysore, and especially in the neighbourhood of Bangalore, where it may be seen on every bare rock.

It is not uncommon also on the edges of the Nilgherries up to the height of nearly 6000 feet. Mr. W. Theobald has collected specimens from Pind Dadun Khan.

It attains to a length of from 15 to 16 inches, of which the tail takes 11 inches.

STELLIO, *Daud.*

Tympanum naked. Body depressed, covered above and laterally with scales unequal in size and shape; tail rounded, tapering, surrounded by rings of more or less prominent spinous scales. Throat with a cross fold; no gular sac; nuchal crest none or rudimentary; ventral scales small, smooth; femoral and præanal pores none.

We refer to this genus not only the African type, *Stellio cordylinus*, distinguished by the large spinous scales of the tail, but also an Indian lizard, *Laudakia tuberculata*, Gray, in which the caudal spines are reduced to prominent keels of the scales. The latter agrees in this respect with a third species of *Stellio*, the *St. cyanogaster* of Rüppell, from Arabia, which, however, has a small crest on the neck. These lizards have no true præanal pores*; but the epidermis of all the scales in the præanal region becomes thickened, callous, and of a brown colour in the males during the breeding-season.

Only one species is known from British India.

STELLIO TUBERCULATUS.

Agama tuberculata, Gray, *Ill. Ind. Zool.* c. fig. mediocri. *Dum. & Bibr.* iv. p. 488.

Laudakia tuberculata, Gray, *Lizards*, p. 254.

? *Stellio indicus*, Blyth, *Journ. As. Soc. Beng.* xxii. p. 646.

Barycephalus sykesii, Günth. *Proc. Zool. Soc.* 1860, p. 150. pl. 25. fig. A.

The head is rather depressed and flat, with the canthus rostralis distinct and with the snout of moderate length; it is covered above with numerous very small shields; there is a shield in the middle of the occipital region, which is rather larger than the others, but it is not present in all the specimens; a series of slightly keeled shields runs along the median line of the snout. The width of the space between the bony orbits is one-half that of the upper eyelid. The rostral shield is low, twice as broad as high: there are twelve upper

* Gray and Bibron speak of præanal pores in *Laudakia tuberculata*, which is the reason of my not having at first recognised this species, and, considering it as a new form, I described it as *Barycephalus sykesii*.

labials. The nostril is in a single shield, which is situated between the canthus rostralis and the first upper labial. The loreal region is concave, and covered with minute shields. The median shield of the lower jaw is subpentagonal, and longer than broad; the lower labials are eleven in number, and higher than those of the upper lip; several other series of very small shields run parallel to that of the labials, the remainder of the throat being covered with minute granules. A low spiny crest proceeds from below the eye to the tympanum, the anterior circumference of which is also provided with spinous scales; there are several other groups of spines between the tympanum and the fold of the throat, and on the sides of the neck, which is exceedingly finely granulated.

The trunk is depressed and flattened: the back is covered with small imbricate scales, each being provided with a strong keel; they gradually pass into the granulations of the sides, which, however, are intermixed with small scattered spines. The belly is covered with smooth square shields arranged in transverse series; they are so small that I counted fifty of them in one of the series in the middle of the belly.

The tail is considerably depressed at the base, assumes gradually a more conical form, and tapers posteriorly into a fine point; it is verticillated. The scales form rings, are quadrangular and strongly keeled, each keel terminating posteriorly in a small spine. The scales which are the largest and provided with the strongest keels are those on the anterior and superior parts of the extremities; the scales round the joints and on the posterior and inferior sides are smaller and smooth. The fore leg reaches to the loin, if laid backwards; the third and fourth fingers are the longest, and equal in length; the second and fifth are shorter, and equal each other in length; the first is the shortest. All the fingers and toes are slightly compressed and armed with strong claws. The hind leg reaches to the end of the snout, if laid forwards; the fourth toe is the longest, somewhat longer than the third and fifth, which are nearly equal; the second is considerably shorter, and the first is the shortest.

The ground-colour of the upper parts is a dusky brown, the back being irregularly speckled with black; two of the specimens exhibit also some lighter indistinct spots; the lower parts are whitish; the throat is reticulated with greenish; one specimen has the breast dotted with bluish green.

Our specimens were obtained at Simla, and in Tibet, where it extends to an elevation of 15,000 feet, according to a statement of Messrs. von Schlagintweit, who collected these specimens. If I am correct in referring the *Stellio indicus* of Blyth (which is very superficially characterized) to this species, it occurs also in Upper Hindostan (Mirzapore, Wuzzeerabad). It attains to a length of 11 or 12 inches, the tail measuring 7 or 8 inches.

TRAPELUS.

Trapelus, (Cuv.) Gray, *Lizards*, p. 258.

Tympanum naked. Body depressed, covered with irregular scales unequal in size; tail rounded, tapering, covered with imbricate keeled scales, not arranged in rings; head and neck without spines. Throat with a cross fold; nuchal crest none, or rudimentary; a series of anal pores in the male.

This is a North-African genus, extending into Western Asia; the following species appears to reach farthest westwards into British India.

TRAPELUS MEGALONYX. (Plate XIV. fig. C.)

Head thick, short, triangular, covered above with numerous small convex shields; canthus rostralis none; superciliary edge prominent, shielded with longish, narrow plates; nostril anteriorly on the snout; the upper lip is surrounded by thirty-nine small square labials, the rostral scarcely differing from them in size or shape. Ear small, deeply sunk; its upper margin slightly denticulated; throat covered with very small smooth scales; a transverse fold across the whole throat. No trace of a crest on the neck. Body above covered with rather small, rhombic, keeled scales, irregularly arranged, with numerous larger ones scattered over the whole of the back and of the sides; ventral scales small, very indistinctly keeled, in about twenty-two oblique series between the fore legs. No anal pores in the female. All the scales on the tail are rhombic, keeled, imbricate, subequal in size. Legs rather slender: the fore leg reaches beyond the hip-joint, if laid backwards; the fingers are strong, provided below with a triple series of spines, and armed with very strong and long claws, each of which is at least as long as the thumb without claw. The hind leg extends to the eye, if laid forwards; toes with the claws of moderate strength, one-third as long as those of the fore leg; the fourth toe is one-fourth longer than the third.

Greyish, marbled with brown; a series of six ocellated white spots, edged with blackish, along the vertebral line.

The specimen on which I have founded this species is $5\frac{1}{2}$ inches long, the tail measuring 3 inches. It formed part of Mr. Griffith's collections which were sent to the Museum of the East India Company, and which were afterwards transferred to the British Museum. The collections made by Griffith being from Afghanistan and from Khasya, it is probable that this species, belonging to a western genus, was obtained in the former country. Moreover, as the Afghan collection was not in so good a state of preservation as the Khasyan, and as this specimen of *Trapelus* is in much the same state of preservation as the other specimens of Griffith's Afghan collection, it is reasonable to conclude that it came from Afghanistan, and not from Khasya.

PHRYNOCEPHALUS, *Kaup.*

Head very short, depressed, obtusely rounded in front; nostrils in front of the snout, directed upwards and forwards. Tympanum hidden. Body and tail depressed, covered with very small scales; no dorsal crest whatever; throat with a transverse fold; no præanal or femoral pores.

The species of this genus may be easily recognized by the form of the head, which is extremely short, and almost as broad as long; there is no canthus rostralis; and a very distinct groove runs round the upper jaw, above the labial shields. The nostrils are entirely in front of the snout, being directed forwards. Labial shields numerous, small, square, or sometimes triangular, like fringes; rostral none, replaced by several labials. Tongue slightly pointed, not notched. Eyes rather small, with the eyelids well developed, the upper being hidden below the projecting superciliary ridge. Head covered above with small shields, those on the snout and occiput being the largest and convex. Throat with granular scales. Trunk much depressed, covered with very small scales above, which become granular on the sides; those of the belly are rather larger than those on the back. Tail depressed, at least at its base, in some species rather slender, in others somewhat stouter, and said to be prehensile; it is covered with scales similar to those on the trunk. Legs well developed.

This genus is peculiar to Central Asia; but the two following species extend southwards to Afghanistan and to the southern parts of Tibet. They are probably inhabitants of rocky parts, and we doubt much whether the tail of some of the species is truly prehensile.

- Tail slender, with spinous tubercles at its base *Ph. tickelii*.
 Tail stoutish, without tubercles *Ph. caudivolutus*.

PHRYNOCEPHALUS TICKELII.

- ? *Phrynocephalus olivieri*, *Dum. & Bibr.* iv. p. 517.
Phrynocephalus tickelii, *Gray, Lizards*, p. 260.

Tail depressed at the base, slender, not prehensile, with a series of small spinous tubercles along each side of its basal portion. Scales of the upper parts of equal size, except in the sacral region, where some larger ones are intermixed with the others. Thirty-one upper labials, most of which are triangular and slightly pointed. The hind leg extends to the eye, if laid forwards. Tail with alternate broad whitish and blackish rings.

The typical specimen of *Ph. tickelii* is from Afghanistan, and in a bad state of preservation. It is at all events very closely allied to, if not identical with, *Ph. olivieri*. The latter appears to have square upper labial shields, more numerous larger dorsal scales, and tubercles on the root of the tail. Whether these differences are of specific value, we cannot decide from a

single example. The tail is so slender that it cannot have been used as a prehensile organ. Our specimen is 4 inches long, the tail measuring $2\frac{1}{2}$ inches.

PHRYNOCEPHALUS CAUDIVOLVULUS.

Lacerta caudivolvula, *Pall. Zoogr. Ross.-As.* iii. p. 27.

Phrynocephalus caudivolvulus, *Wagl. Syst. Amph.* p. 144. *Eichw. Faun. Casp.-Cauc. Rept.* p. 85. t. 12. f. 6, 7, t. 13. f. 9-14. *Dum. & Bibr.* iv. p. 522.

Agama ocellata, *Lichtenst. in Everm. Reis.* p. 143.

Phrynocephalus tickelii, *Günth. Proc. Zool. Soc.* 1860, p. 161 (not Gray).

Tail depressed in its whole length, stoutish (prehensile?), without any tubercles. All the scales of the upper parts of equal size, very small. Twenty-six quadrangular upper labials. The hind leg does not quite extend to the eye, if laid forwards. Greyish olive marbled with blackish; tail with a series of irregular blackish spots on each side; adult specimens with the middle of the belly and the terminal portion of the tail black.

The specimens which I formerly referred to *Ph. tickelii*, but which, on a renewed examination, I consider as identical with *Ph. caudivolvulus*, were obtained by Messrs. von Schlagintweit, in Tibet, and, according to their statement, at an elevation of more than 15,000 feet above the level of the sea. The species appears to be common in Tartary and other parts of Central Asia. At my request, Professor Peters of Berlin has kindly compared the Tibetan examples with the typical specimen, and informs me that they are specifically identical. A full-grown specimen is 4 inches long, the tail measuring $2\frac{1}{2}$ inches.

Appendix to the Agamidae.

Mr. Blyth has shortly indicated an Agamoid Lizard which had been sent to him by Mr. Jerdon from Sagur. It is just possible that this animal may be recognized when rediscovered; but from the description alone it is impossible to characterize the new genus *Brachysaura*, or to fix its position in the family of *Agamidae*.

BRACHYSAURA ORNATA (Blyth, *Journ. As. Soc. Beng.* xiv. 1856, p. 448).—A *Calotes* with enormous head, short and thick body, the tail not exceeding the body in length, and the toes also short and strong; a slight nuchal crest, and medial dorsal ridge composed of a row of high keeled scales; two detached tufts of nuchal spines, one contiguous to the tympanum, and each comprising one principal spine. Colour olive, with a row of large round dark spots, bordered and set off with white, along the back and anterior half of the tail, continued as simple indistinct dark spots to the end of the tail; the white broader and forming a kind of pale spot on each side of the neck; and anterior to this first large spot is a small one upon the crest; lower parts yellowish white, the throat regularly speckled with pale dusky; a conspicuous oblique white band passing from beneath the eye to the angle of the mouth. Scales of the body in transverse bands, the oblique tendency much less conspicuous than in *Calotes*.

FAMILY OF CHAMELEONS—*CHAMÆLEONIDÆ*.

Head large, angular, covered with numerous very small, flattish or convex shields; body compressed, covered with granular scales above and below; tail long and prehensile. Tongue exceedingly long, worm-like, club-shaped and viscous in front, very extensile. Eyes globular, very mobile, covered with a circular lid which is pierced with a small central hole. Tympanum hidden. Legs thin, each with five toes, formed into two grasping opposable groups.

The proper native country of the Chameleons is Africa, which is inhabited by numerous species; they extend to the northern shores of the Mediterranean and into South-western Asia, into Hindostan and Northern Ceylon. Their habits are so perfectly known, that it would be almost superfluous to give a detailed account of them. They live on trees: each of their feet is converted into a grasping hand, by means of which, assisted by a strong prehensile tail, they hold so fast to the branch on which they are sitting that they can only with difficulty be removed from it: on the ground and in water they are nearly helpless. Although extremely slow in their locomotion, they feed on insects, which they catch by darting their long viscous tongue at the prey, which remains attached to it. The inflexibility of the neck is compensated by the wonderful structure of the eyes, which are so prominent that more than one-half of the ball stands out of the head; and not only can they be moved in any direction, but each has an action independent of the other: one eye may be looking forwards, whilst an object behind the animal is examined with the other.

The faculty of changing colour possessed by the Chameleons, although common to numerous other lizards, has become proverbial, and is so much developed that one side may assume a colour different from that of the other.

They are oviparous, depositing, under leaves, from ten to twelve oval eggs with calcareous shells.

The species have been left together in one genus: only one species is found in British India.

CHAMÆLEO VULGARIS. The Common Chameleon.

Lacerta chameleo, *L. Syst. Nat.* p. 364.

Chameleo ceylanicus, *Laur. Rept.* p. 46. *Jerdon, Journ. As. Soc. Beng.* xxii. p. 466.

— *vulgaris*, *Daud. Rept.* iv. p. 181.

A denticulated ridge along the back and belly; occiput with a prominent longitudinal crest, highest behind, and separated from the nape by a deep groove. Scales of the body small, granular, of equal size.

We can confirm the observation made by Mr. Jerdon, viz. that most of the Indian specimens are of a green colour, uniform, or irregularly spotted and banded with dark green or brown; whilst in African specimens the ground-colour is greyish, olive, yellowish or brownish.

This, however, does not appear to amount to a specific difference. This Chameleon is found in many parts of the Peninsula of India and in the northern parts of Ceylon; it attains to a length of 10 inches, the tail taking more than one-half.

The occurrence of a second species of Chameleon in India (*Ch. pumilus*, Latr.), mentioned by Jerdon (*l. c.*), is extremely doubtful.

THE ORDER OF SNAKES—OPHIDIA.

Body exceedingly elongate, without limbs, or with merely rudiments of limbs, scarcely visible from without; the ribs are articulated moveably with the vertebral column; no sternum; generally both jaws and the palate toothed; the mandibles united in front by an elastic ligament, and generally very extensible. Eyelids none. Integuments with numerous scale-like folds, rarely tubercular.

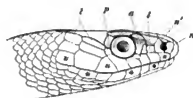
In the general remarks on the preceding Order, that of Saurians (p. 56), we have observed that there is no sharp boundary-line between it and that of Snakes; we have mentioned apparently limbless Saurians, of Ophidian appearance, but the systematic position of which is decided by the structure of their jaws. On the other hand, certain Ophidians remind us, by several characters, of the Saurian type; we allude to the snakes forming the first four families (*Typhlopidae*, *Tortricidae*, *Xenopeltidae*, *Uropeltidae*), which are distinguished by polished, closely adherent, rounded, subequal scales, much resembling the smooth scales of some Scincoids; most of them have a very narrow mouth, unlike the enormous gape of the typical Serpents, and some are without that longitudinal fold in the median line of the chin which is so characteristic of Ophidians; moreover, most have rudiments of the bones of a pelvic arch. The reason why we adopt the view of those systematists who refer these reptiles to the Ophidians, instead of associating them with the limbless Scincoids, is the loose connexion of their jaw-bones, a character which must be considered as peculiar to the Ophidians, and which is only somewhat less developed in the families mentioned than in the typical forms. The two halves of the lower jaw in Ophidians, namely, are not united by an osseous symphysis, but by an elastic ligament. The intermaxillary is but little developed, generally without teeth, and coalesces with the nasal bones and the vomer into a single moveable bone. The intermaxillary, palatine, and pterygoid bones are so loose that they can not only be easily pressed outwards and forwards, but even the intermaxillary and mandibular of one side can be moved in those directions independently of the bones of the other side. The mandible is suspended from a much-elongated tympanic bone.

This peculiar mobility of the jaw-bones enables the snakes to extend the gape in an extraordinary degree, and to work their prey down through the collapsed pharynx.

Other snakes, as the *Pythonidæ* and *Erycidæ*, also have rudiments of hind limbs; but in other respects, especially in the structure of the mouth, they have the Ophidian character so much developed that there cannot be any doubt as to their position in the system.

The organs of locomotion for the exceedingly elongate body of the snakes are the ribs, the number of which is very great, nearly corresponding to that of the vertebrae of the trunk. Although their motions are in general very quick, and may be adapted to every variation of ground over which they move, yet all the varieties of their locomotion are founded on the following simple process. When a part of their body has found some projection of the ground which affords it a point of support, the ribs, alternately of one and the other side, are drawn more closely together, thereby producing alternate bends of the body on the corresponding side. The hinder portion of the body being drawn after, some part of it finds another support on the rough ground or a projection; and the anterior bends being stretched in a straight line, the front part of the body is propelled in consequence. During this peculiar kind of locomotion the numerous broad shields of the belly are of great advantage, as, by means of the free edges of those shields, they are enabled to catch the smallest projections on the ground which may be used as points of support. A pair of ribs correspond to each of these ventral shields. The snakes are not able to move over a perfectly smooth surface.

The snakes are naked, like all other reptiles: that is, no separate epidermal productions form the external integument, but the epidermis is very regularly laid into scale-like folds on the back and the sides, and into broad imbricate transverse shields or plates on the belly. The epidermis on the head is generally divided into non-imbricate shields. The form of the scales and ventral shields, the number of their longitudinal and transverse series, and the shape and arrangement of the head-shields are of the greatest value for the distinction of the species and genera. The following woodcuts of the head of a snake with the normal arrangement of the shields (*Ptyas korros*) will explain the terms used for their denomination:—



r. Rostral.
f. Anterior frontal.
f. Posterior frontal.
v. Vertical.
s. Supraocular.
o. Occipital.

n, n'. Nasals.
l. Loreal.
a. Anterior ocular or orbital;
anteocular or præorbital.
p. Posterior ocular or orbital;
postocular or postorbital.

u, u. Upper labials.
l, l. Temporals.
m. Median lower labial or
mental.
**. Lower labials.
c, c. Chin-shields.

The skin does not form eyelids; the part of the epidermis which covers the eye is transparent, convex, and has the shape of a watch-glass, behind which the eye moves. The epidermis is cast off in a single piece several times every year.

Generally the snakes are provided with numerous teeth, which are elongate, conical, thin and pointed like a needle, and more or less bent backwards. In the *first suborder*, that of *non-venomous snakes*, the teeth are either entirely smooth, or only the last of the maxillary series is provided with a faint longitudinal groove, which is not intended to convey a poisonous saliva into a wound, as the saliva of these snakes has never been proved to be poisonous: the groove appears to increase the strength of the tooth. Many of the non-venomous snakes have long teeth in front of the jaws or of the palate, but they are never grooved or perforated, and only serve to afford a firmer hold on the living and struggling prey.

The *poisonous* snakes are armed with a long canaliculated tooth in front of the upper jaw; the channel terminates in a small slit at the extremity of the tooth, and is in connexion with a duct which carries the poisonous fluid from a large gland to the tooth. This venom-gland corresponds with the parotid salivary gland of the Mammals, and is situated on the side of the head, above the angle of the mouth; it is invested by a dense fibrous sheath, which is covered by a layer of muscular fibres. At the moment the snake opens its mouth to bite, these muscles compress the gland, and force its contents through the excretory duct into the channel of the venom-tooth, whence it is injected into the wound. We may judge of the force of this pressure when we read the accounts of travellers who have seen irritated animals spouting the poison from the aperture of the tooth to a short distance. The venom-apparatus serves these creatures not only for defence, but also and chiefly for the purpose of overpowering their prey, which is always killed before they commence to swallow it.

The structure of the venom-tooth is not the same in all poisonous snakes: in some it is fixed to the maxillary bone, which is as long, or nearly as long, as in the non-venomous snakes, and generally bears one or more ordinary teeth on its hinder portion. The venom-tooth is fixed, more or less erect, not very long, and its channel is generally visible as an external groove. The poisonous snakes with such a dentition have externally a more or less striking resemblance to the non-venomous serpents; and on this account they are designated as *venomous colubrine snakes*, forming the *second suborder* of snakes (Cobras, Bungarums, Sea-snakes, &c.).

In the other venomous snakes, the *third suborder*, the maxillary bone is extremely short, and does not bear any teeth except an exceedingly long fang, with a perfectly closed, externally invisible channel in its interior. Although this tooth also is fixed to the bone, the bone itself is very mobile, so that the tooth, which is laid backwards when at rest, can be erected the moment the animal prepares to strike. This tooth, like all the other teeth, is not only occasionally lost, but appears to be shed at regular intervals. From two to four other venom-teeth in different stages of development, destined to replace the one in action, exist between the folds of the gum, and are not ankylosed to the bone.

Most of the snakes feed on living animals,—only a few on eggs: some of them first kill their prey by poisoning it, as we have mentioned, or by smothering it between the coils of their body; others swallow the struggling victim alive. As they do not possess organs for tearing the prey to pieces, nor a dentition fit for mastication, the prey is swallowed entire; and in consequence of the great width of the mouth and of the extraordinary extensibility of

the skin, of the œsophagus, and of the stomach, they are able to swallow animals the girth of which exceeds their own. The process of digestion is very quick, and considerably accelerated by the quantity of saliva secreted during deglutition, or injected into the animal by serpents with poison-fangs; for, physiologically, the poisonous saliva of the venomous snakes performs the same office in their economy as the non-poisonous of the innocuous species. All the snakes drink much, and die when they are deprived of water.

The tongue is long, vermiform, forked, terminating in two long thread-like points; it is the organ of touch, and is frequently and rapidly exerted to examine an object; the slightest provocation brings the action of the tongue into play. All the internal organs imitate the elongate form of the body, being long and narrow: most snakes have the lung of only one side developed.

The greater part of the snakes are oviparous, the eggs having an oblong form, and a soft, leathery shell. The Pythons alone incubate their eggs, whilst all the other oviparous snakes leave them to the heat of the place where they have been deposited. Other snakes (the freshwater and poisonous species) are viviparous, the embryos being developed in the oviduct of the mother.

Snakes may be said to be found wherever the climatic relations and the progress of culture have not put a natural or artificial barrier to their existence. The consequence of such an extensive distribution over the globe's surface is that they differ much in their mode of life, exhibiting a variety of corresponding characters which are most important for their natural subdivision. We may, then, distinguish—

1. *Burrowing Snakes*, living under ground, only occasionally appearing above the surface. They are distinguished by a rigid, cylindrical body, short tail, narrow mouth, small head not distinct from the neck, little teeth in small number, and by the absence or feeble development of the ventral shields. They feed chiefly on small invertebrate animals. None of them are venomous.

2. *Ground Snakes*, or species which live above ground, and only occasionally climb bushes or enter the water; their body is more or less cylindrical, very flexible in every part, and of moderate proportions. Their ventral shields are broad. They feed chiefly on terrestrial vertebrate animals. By far the greater number of snakes belong to this category, and it is represented by many variations in all the three suborders.

3. *Tree Snakes*, or species passing the greater part of their life on bushes and trees, which they climb with the greatest facility. They are distinguished either by an exceedingly slender body, with broad, sometimes carinated ventral shields, or by a prehensile tail. Many of the species are characterized by their vivid coloration, of which green forms the principal part. We shall see in the sequel that the first and third suborders offer numerous instances of Tree Snakes, the Tree Snakes of the second suborder being confined to tropical Africa. They feed on animals which have a mode of life similar to their own,—only a few species on eggs.

4. *Freshwater Snakes*, distinguished by the position of the nostrils, which are placed on the top of the snout, and by a tapering tail. They inhabit fresh waters, and are, therefore, excellent swimmers and divers; only a few species (which also in external characters approach the following group, that of the true Sea Snakes) venture out to sea. They feed on fish, frogs, crustacea, and other water-animals, and are viviparous. None are venomous.

5. *Sea Snakes*, distinguished by a strongly compressed tail, and by the position of the nostrils, which are placed as in the last group. They live in the sea only, occasionally approaching the land, feed on marine fish, are viviparous, and venomous. One genus only (*Platurus*) has the ventral shields so much developed as to be able to move on land.

Although these five groups are not separated from each other by defined lines of demarcation, and frequently pass into one another by intermediate forms, yet a family and genus which should be composed of species of several of these groups would be a very unnatural assemblage of heterogeneous forms.

Tropical India surpasses every other part of the globe in the number of Ophidian forms, and almost every investigation of a limited but previously unexplored district is sure to add largely to our knowledge of them. Unfortunately the proportion of venomous snakes is somewhat large, and as we hope that this treatise will not be confined to the use of the professed naturalist, we think it useful to add a few words on these dangerous animals in general, and on the means to counteract the effects of their bite.

The degree of danger depends but little on the species which has inflicted the wound, but rather on the bulk of the individual, on the quantity of its poison, on the temperature, and on the place of the wound. Large snakes have generally larger fangs, penetrating more deeply into the flesh, and produce and inject a greater quantity of poison: the bite of a snake not exceeding 18 to 20 inches in length will rarely be followed by a fatal result when the wounded person is an adult. Further, it has been experimentally proved that a snake which has bitten several times within a short time exhausts its stock of poison, and the effects of the fourth or fifth bite are much less dangerous than of those preceding, and it may indeed be entirely harmless. Therefore the danger from a snake which has bitten a person shortly after it has fed is considerably reduced. The temper of snakes generally depends much on the temperature, so that the same individual snake which shows itself extremely fierce during the hottest part of the day becomes sluggish when the temperature sinks, biting only when provoked, and with but little energy. The parts of the human body in which a wound inflicted by a snake is most dangerous are those which are distinguished by the abundance of blood-vessels, or those which can be caught by the snake between both its jaws, so that the animal is enabled to fix its fangs deeply. If unfortunately a larger blood-vessel is pierced by the fang, the poison is carried instantaneously into the mass of the blood, and sudden death is almost always the result.

Although it is always possible to recognize the venomous nature of a snake from external characters only, yet this requires such a knowledge of snakes as can be attained only by a special study of them; it would, therefore, be a useless attempt to enumerate here the different characters by which a dangerous species may be distinguished externally from a harmless one. The wound itself speaks for or against the venomous nature of a snake which has bitten. When there are numerous punctured wounds disposed in two lines, thus, . . . the snake is not poisonous; but when there are only two (. . .) they are most probably inflicted by a venomous snake, although there is still some hope that it may have been one of those innocuous snakes which have long, non-perforated fangs in front (*Lycodons*, *Dipsades*, &c.); in such a case much anxiety may be spared if the snake is killed at once and properly inspected.

The treatment to be followed in all cases of poisoned wounds caused by snakes must be

local as well as internal; and both must be resorted to at once, especially the former, immediately the accident has happened.

1. If the wound is on some part of the hand, arm, or foot, one or two ligatures should be made as tightly as possible at a short distance above the wound, to prevent the absorption of the poison. The ligature is left until the proper means are taken to destroy the virus in the wound and until medicine is taken internally, or until great pain or swelling necessitate its removal.

2. The punctured wounds are to be enlarged by incisions at least as deep as the wounds, to cause a free efflux of the poisoned blood, and to facilitate its removal by sucking.

3. The wounds should be sucked either by the patient himself or by another person whose mouth is free from any solution of continuity; cupping-glasses answer the same purpose in cases where they can be applied.

4. The wound should be washed with ammonia, and its vicinity rubbed with it. Cauterization with a red-hot iron, or with sulphuric acid, butter of antimony, nitrate of silver, &c., are of great advantage, if done before the virus has spread far beyond the place of the bite.

5. Internally, ammonia should be taken in large doses—one, two, or three wineglasses of the eau de luce. Where this is not at hand, from one to six glasses of brandy may be taken at short intervals.

In all accidents caused by bites of snakes the action of the heart is much affected; its contractions become feeble, the respiration difficult, and the patient feels great anguish or sinks into a fainting state. To prevent a complete collapse it is necessary to use these strong excitants, and to repeat them until the alarming symptoms are allayed. It would be a great risk in such a case to trust to the remedies of a snake-charmer.

First Suborder.

OPHIDII COLUBRIFORMES—INNOCUOUS SNAKES.

Snakes without grooved or perforated fang-like teeth in front.

Synopsis of the Families.

- I. Body cylindrical, rigid, covered with comparatively large, polished, firmly adherent scales; head not distinct from neck; none of the teeth are enlarged.
- Ventral scales not larger than those on the back; mental groove none;
upper labials four *TYPHLOPIDÆ*, p. 170.
- Ventral scales but little larger than the others; mental groove present;
upper labials six *TORTRICIDÆ*, p. 178.
- Ventral shields distinct; two pairs of frontals; five occipitals . . . *XENOPELTIDÆ*, p. 180.

- Tail extremely short, truncated, scarcely tapering, generally terminating in a rough naked disk, or covered with keeled scales * *UNOPELTIDÆ*, p. 182.
 Ventral shields distinct; two occipitals; tail tapering *CALAMARIDÆ*, p. 194.
- II. Body rather rigid, covered with rounded, smooth scales; ventral shields developed; head short, not distinct from neck; teeth of the maxillary few in number, the last enlarged, not grooved.
 Rostral shield large, more or less produced backwards *OLIGODONTIDÆ*, p. 205.
- III. Body flexible throughout; ventral shields developed; head more or less distinct from neck; a mental groove; no rudiments of hind limbs.
 Body neither very slender nor much compressed; nostril lateral; no fang-like tooth in front or in the middle of the upper jaw *COLUMBRIDÆ*, p. 220.
 Nostrils on the top of the snout *HOMALOPSIDÆ*, p. 275.
 Body elongate or stout; pupil round or vertical; loreal region concave; one of the four anterior maxillary teeth is enlarged, the last grooved *FRAMMOFIDÆ*, p. 290.
 Body and tail much compressed or very slender; head elongate; snout obtuse or rounded; pupil round; no fang-like tooth in front *DENDROPHIDÆ*, p. 298.
 Body generally excessively slender; head very long, with tapering snout; pupil linear, horizontal; last maxillary tooth grooved *DRYOPHIDÆ*, p. 300.
 Body and base of the tail much compressed; head subtriangular, broad behind, very distinct from neck, with short snout; loreal region flat *DIPSADIDÆ*, p. 307.
 Maxillary with a fang-like tooth in front, but without elongate posterior tooth *LYCUDONTIDÆ*, p. 314.
- IV. Body flexible; ventral shields developed; head thick, very distinct from neck; no mental groove.
 Maxillary teeth very small, few in number *AMBYCEPHALIDÆ*, p. 324.
- V. Body cylindrical, flexible; anterior maxillary teeth unequal in length; none of the hinder teeth enlarged; rudiments of hind limbs present.
 Tail prehensile *PYTHONIDÆ*, p. 328.
 Tail very short, not prehensile *ERTCIDÆ*, p. 332.
- VI. Body, head, and tail covered with small, wart-like, not imbricate scales.
 Tail prehensile *ACROCHORDIDÆ*, p. 335.

* See *Melanophidium*, p. 193.

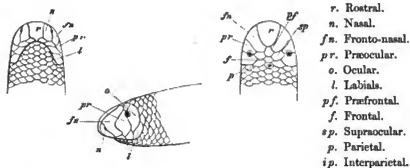
FAMILY OF BLIND SNAKES—*TYPHLOPIDÆ*.

Body cylindrical, with very short head not distinct from neck, and with a very short tail. The body and tail are covered with rounded, polished, imbricate scales, equal in size and form above and below; fore part of the head covered with large shields, upper labials four. Eye rudimentary, covered by, and more or less transparent from below, the shields; cleft of the mouth inferior, very short and narrow; jaws scarcely dilatible. A few teeth in the upper jaw only, none in the lower or on the palate; maxillaries very short, mandibles feeble; no longitudinal fold at the chin. Rudiments of hinder extremities are hidden below the skin.

This family contains forms which are most remote from the true Ophidian type. They live under ground, their rigid body and short curved tail being adapted for burrowing. After showers of rain they occasionally appear above ground, and then they are very agile in their serpentine movements. The eye, which is scarcely visible in many species, can give to them only a general perception of light. They feed on worms and small insects; the tongue is forked and, as in other snakes, frequently exerted. They are oviparous.

The smallest species of snakes belong to this family, some of them being only half the size of a common earthworm. Species are found in almost every part of the tropical regions, and in the countries adjoining them.

The determination of the species will be found to be not an easy task, and I consider it necessary to give an explanation of the terms generally used in distinguishing the different head-shields.



The Indian species belong to the following genera:—

- | | |
|---|---------------------------------|
| Præocular none | <i>Typhlina</i> , p. 171. |
| A præocular; rostral obtusely rounded in front | <i>Typhlops</i> , p. 172. |
| A præocular; rostral with a trenchant anterior edge | <i>Onychocephalus</i> , p. 177. |

TYPHLINA, *Wagler*.

Snout covered with large shields; rostral shield large, rounded in front; præocular none; nostril inferior; nasal and fronto-nasal simple. Lower jaw without teeth.

Only one species is known.

TYPHLINA LINEATA. (Plate XVI. fig. B.)

Typhlops lineatus, *Boie, Isis*, 1827, p. 563. *Schleg. Abbild.* p. 39. taf. 32. figs. 32-34 (incorrect).

Ptilodon lineatum, *Dum. & Bibr.* vi. p. 259.

Typhlinalis lineatum, *Gray, Lizards*, p. 134.

Shields of the snout thick, horny; eyes scarcely visible. Rostral shield large, more than half as broad as the head, its lower portion being broader than long. Nostril inferior; nasal small, united with the fronto-nasal above the nostril; fronto-nasal large, as broad as the lower portion of the rostral shield, extending to behind the rostral, but remaining separate from the fronto-nasal of the other side. Ocular not quite so broad as the fronto-nasal. Labials four, none of which ascend between the lateral shields of the head: the first in contact with rostral, nasal, and fronto-nasal, the second with fronto-nasal and ocular, the third with ocular alone, and the fourth with a temporal shield; the third is larger than the fourth. The præfrontal and the supraoculars are rather larger than the parietals, the frontal and interparietal being considerably smaller, scarcely larger than the other scales.

The hind part of the body is rather thicker than the front part, more so in females than in males; its circumference in its middle is one-fourteenth of the total length. Tail very short, slightly curved, terminating in a minute spine; its length equals the width of the head. Body surrounded by twenty-two longitudinal series of scales. I count 405 transverse series (about 430, *Dum. & Bibr.*); eight series round the tail.

Reddish olive above, with brown lines running along the joining edges of the longitudinal series of scales; these lines are either straight or in a short zigzag. Snout and belly yellow; tail either uniform yellow or with a yellow band across its back.

This species is known from Java, Sumatra, and Pinang. We have received also a specimen from Hongkong. It attains to a length of 18 inches.

Three different views of the head are given on Plate XVI., of twice the natural size.

TYPHLOPS.

Typhlops (sp., *Schneid.*), *Dum. & Bibr.*

Snout covered with large shields; rostral large, rounded in front; præocular present; nostril laterally in front of the snout.

Inhabitants of almost every part between the tropics. The following species occur in British India:—

I. *Subocular none.*A. *Fronto-nasal in contact with the second labial.*

Scales in twenty-six series; black above, yellow below *T. nigro-albus*, p. 172.

Scales in twenty-six series; the darker coloration of the back gradually passing into that of the lower part *T. horsfieldii*, p. 173.

Scales in twenty-four series; four grooves at the lower side of the snout *T. bothriorhynchus*, p. 174.

Scales in twenty-four series; each scale with a yellow, posteriorly black-edged cross streak *T. striolatus*, p. 174.

Scales in twenty-two series *T. siamensis*, p. 175.

B. *The fronto-nasal is separated from the labials by the intervening nasal and præocular shields.*

The circumference of the body is $\frac{1}{3}$ th of the total length *T. braminus*, p. 175.

The circumference of the body is $\frac{1}{4}$ th of the total length *T. tenuis*, p. 176.

II. *A subocular below the præocular.*

Scales in eighteen series *T. mirus*, p. 176.

TYPHLOPS NIGRO-ALBUS. (Plate XVI. fig. F.)

Typhlops nigro-albus, *Dum. & Bibr.* vi. p. 295. *Cantor, Mal. Rept.* p. 51.

Argyrophis bicolor, *Gray, Lizards*, p. 136.

The upper part of the rostral shield is not quite twice as broad as the lower; nostril lateral; nasal entirely separated from the fronto-nasal, the suture between both shields being continued above the nostril. The fronto-nasals are close together behind the rostral, without touching each other; their broadest part is just above the nostril, where they are as broad as the lower part of the rostral; præocular rather larger than ocular, which extends as far backwards as the hinder labial. Labials four: the first in contact with rostral and nasal, the second with nasal, fronto-nasal, and præocular; the third slightly ascending between præocular and ocular, the fourth below the ocular. Of the scale-like shields of the crown of the head, the supraocular and parietal are rather larger than the others, which otherwise much resemble the scales of the body.

The body is rather thicker behind than in front; the circumference in its middle is contained ten times and a half in its total length. The tail is slightly curved, extremely short, its length being rather less than the width of the head; it terminates in a minute spine.

Body surrounded by twenty-six longitudinal series of scales. I count 353 transverse series (326, Dum. & Bibr.); eight round the tail.

The back (eleven dorsal series of scales) is bluish black, the belly yellowish, both colours being well defined.

This species is found at Pinang, Singapore, and in Sumatra; it attains to a length of 14 inches.

The three views of the head on Plate XVI. are of twice its natural size.

TYPHLOPS HORSFIELDII. (Plate XVI. figs. E, E'.)

? *Typhlops diardii*, Schleg. *Abbild.* p. 39. *Dum. & Bibr.* vi. p. 300.

Argyrophis horsfieldii, Gray, *Lizards*, p. 137.

Closely allied to *T. nigro-albus*.

The width of the upper part of the rostral shield is one-third of that of the head, and not much more than that of its lower portion. Nostril lateral: nasal united with fronto-nasal above the nostril; its lower portion is considerably broader than that of the fronto-nasal. The fronto-nasals extend backwards to behind the rostral, but remain widely separate. Preocular subequal in size to the ocular, which extends as far backwards as the hinder labial. The labials are the same as in *T. nigro-albus*.

The size of the scale-like shields on the crown of the head varies in different individuals:—

a. In specimens from Assam and Khasya (fig. E) the supraoculars and parietals are larger and broader than the frontals and interparietal.

b. In a specimen from the coast of Tenasserim (fig. E') the anterior frontal is the largest scale, and the interparietal the smallest.

c. The typical specimen of *T. diardii* is from Cochin-China, and, if we are correct in identifying it with *A. horsfieldii*, it is a third variation, having the interparietal larger than the prefrontal.

The body is thicker behind than in front; the circumference in its middle is one-tenth of its length. The tail is slightly curved, extremely short, its length being equal to, or rather less than, the width of the head; it terminates in a minute spine. The body is surrounded by twenty-six longitudinal series of scales. I count in a specimen

from Assam	315	transverse series.
from Tenasserim	304	" "
from Assam	304	" "
and in the typical specimen (Khasya)	288	" "

Nine series round the tail.

Blackish olive above, this colour gradually passing into the dull yellowish of the belly.

This species has been found in Khasya, Assam, on the Tenasserim coast, and in Cochin-China. It attains to a length of 17 inches.

The different views of the head are of twice its natural size.

TYPHLOPS BOTHEIORHYNCHUS. (Plate XVI. fig. G.)

Nostril lateral. A round groove, larger than the nostril, on the suture between nasal and fronto-nasal, below the nostril; another similar but smaller groove on the suture between rostral and nasal. The upper part of the rostral one-third of the width of the head, the lower much longer than broad. Nasal very broad below, as broad as the fronto-nasal in the middle; the suture between both these shields is continued above the nostril. The fronto-nasal extends a little backwards to the hinder side of the rostral; its posterior margin is deeply concave. Præocular and ocular subequal in size. Four labials: the first in contact with rostral and nasal; the second with nasal, fronto-nasal, and præocular; the third slightly ascending between præocular and ocular; the fourth not much larger than the third, scarcely reaching further backwards than the ocular. All the shields on the crown of the head are enlarged, the supraoculars and the interparietal being rather the largest, the latter being very broad, though short.

Body not much thicker behind than in front; the circumference in its middle is one-twelfth of the total length. Tail curved, its length being equal to the width of the head; it terminates in a minute spine. The body is surrounded by twenty-four longitudinal series of scales. I count 329 transverse series; ten series round the tail.

Uniform brownish olive above and below.

I have examined a single specimen from Pinang (Dr. Cantor's collection); it is 7 inches long. The views of the head are of thrice its natural size.

TYPHLOPS STRIOLATUS.

Typhlops striolatus, Peters, Monatsber. Berl. Acad. 1861, p. 922.

The upper portion of the rostral shield band-shaped, extending backwards to between the eyes, broader than the lower part. The nasal is partly united with the fronto-nasal above the nostril, and touches the first and second labials. Fronto-nasals not contiguous behind the rostral, with their lower portion as long as the corresponding part of the nasal; their hind margin is concave. The second labial in contact with nasal, fronto-nasal, and præocular; the third labial has an acute upper angle wedged in between præocular and ocular. Præocular as large as ocular; eye very distinct. Supraorbitals and parietals broader than the frontals, which are of the same size; interparietal nearly twice as broad as frontal.

Body rather thicker behind, surrounded by twenty-four series of scales. Tail shorter than the head, curved, terminating in a minute spine, with eight transverse series of scales.

Olive-brown above, the darker terminal part of each scale separated from the lighter base by a yellow, posteriorly black-edged, transverse streak; paler below.

The typical specimen, a female, $12\frac{1}{2}$ inches long, came from the banks of the Ganges.

TYPHLOPS SIAMENSIS. (Plate XVI. fig. D.)

Closely allied to *T. horsfieldii*.

The width of the upper part of the rostral shield is somewhat less than one-third of that of the head; its lower portion is rather longer than broad. Nostril lateral; nasal united with fronto-nasal above the nostril, considerably dilated in its lower portion. The fronto-nasals extend backwards to behind the rostral, but remain separate; their hinder margin is deeply concave. Præocular as large as ocular, which extends nearly as far backwards as the hinder labial. The labials are the same as in *T. nigro-albus*. The shields on the crown of the head do not show any peculiarity, being subequal in size.

Body scarcely thicker behind than in front; the circumference in its middle is contained thirteen times and a half in the total length. The tail is scarcely curved, extremely short, its length being much less than the width of the head; it terminates in a minute spine. The body is surrounded by twenty-two series of scales. I count 368 transverse series; nine series round the tail.

Upper and lateral parts uniform greyish olive, the lower yellowish.

We have only one specimen of this species, 8½ inches long; it was collected in Siam by M. Mouhot. We have given figures of the head of thrice its natural size.

TYPHLOPS BRAMINUS. (Plate XVI. fig. I.)

Rondoo Talooloo, *Russell, Ind. Serp.* i. p. 48. pl. 43.

Eryx braminus, *Daud. Rept.* vii. p. 379.

Tortrix russellii, *Merr. Tent.* p. 84.

Typhlops braminus, *Cuv. Règne Anim. Dum. & Bibr.* vi. p. 309. *Cantor, Mal. Rept.* p. 52.

— *russellii*, *Schleg. Abbild.* p. 39.

Rostral not much broader above than below, its width being about one-third of that of the head; the nasal is entirely separate from the fronto-nasal, the suture being continued above the nostril to the upper surface of the head; the nasal is in contact with the præocular, below the fronto-nasal. Nostril lateral. Upper part of the fronto-nasal almost as broad as the rostral; it extends rather more backwards than the rostral, but it does not touch its fellow from the other side. Præocular as large as ocular; eye very distinct. Four labials: the first in contact with rostral and nasal; the second with nasal and præocular, but not with fronto-nasal; the third slightly ascending between præocular and ocular; the fourth below the ocular, and extending rather further backwards than the latter shield. Frontal, supra-oculars and parietals equal in size, twice as large as the scales; interparietal equal to a scale.

The body is rather thicker behind than in front; the circumference in its middle is one-thirteenth of the total length. The tail is slightly curved, very short, as long as the head is broad; it terminates in a minute spine. Body surrounded by twenty longitudinal series of scales. In a specimen from Bengal I count 316 transverse series; twelve round the tail.

Uniform brown, paler beneath; the upper shields of the head with a faint, crenulated, whitish marginal line.

This is the most common species of Indian *Typhlopidae*, and almost generally distributed throughout the Indian continent and archipelago; it is common in Ceylon as well as in China and Nepal. It does not attain to any large size, the largest I have seen measuring 8 inches.

The three views of the head are given of four times its natural size.

TYPHLOPS TENUIS. (Plate XVI. fig. C.)

This species is closely allied to *T. braminus*, but comparatively only half as thick. It has the same peculiarity of nasal and præocular touching each other below the fronto-nasal; the nasal extends upwards on the upper side of the head; and the body is surrounded by twenty longitudinal series of scales. But the circumference of the body is only a twenty-fourth of the total length, and I count 366 transverse series round the body and eleven round the tail.

A single specimen, 5 inches long, has been received from Madras. We have given the outlines of its body, to show its slender form.

TYPHLOPS MIRUS. (Plate XVI. fig. H.)

Typhlops mirus, Jan, *Archiv Zoolog.* i. p. 185 (without description).

Rostral shield half as broad as the head, its lower portion being broader than long. Nostril lateral; nasal separated from the fronto-nasal by a suture above the nostril. The fronto-nasal extends backwards behind the rostral without touching its fellow from the other side; it is broadest above the nostril, where it is broader than the rostral; its hinder margin is S-shaped, and bordered by two shields subequal in size, the upper of which is the præocular, the lower a subocular. The ocular is situated behind the præocular and above the fourth labial, the ocular and the fourth labial being rather larger than the præ- and suboculars. The first labial is in contact with rostral and nasal, the second with nasal, fronto-nasal, and subocular, slightly ascending between the two latter shields; the third is smaller than the second and in contact with the subocular only; the fourth is as large as the three others together and in contact with the subocular and ocular. The scale-like shields on the crown of the head are regular, subequal in size, not much larger than the scales.

Body rather thicker behind than in front, its circumference in the middle being one-sixteenth of the total length. Tail not very short, straight, not quite twice as long as broad, terminating in an obtuse point. Body surrounded by eighteen longitudinal series of scales. I count 333 transverse series; fifteen round the tail.

This species is uniformly coloured, like *T. braminus*; its snout is yellow. It is peculiar to Ceylon, where it appears to be rather local, being confined to the interior of the island. The longest of our specimens is 5 inches long.

The three views of the head represent it of six times its natural size.

ONYCHOCEPHALUS, *Dum. & Bibr.*

Snout covered with large shields; rostral with a trenchant anterior edge; præocular present; nostril at the lower side of the snout.

Only one species is found in British India.

ONYCHOCEPHALUS ACUTUS. (Plate XVI. fig. A.)

Onychocephalus acutus, *Dum. & Bibr.* vi. p. 333.

Typhlops russellii, *Gray, Lizards*, p. 132.

Onychocephalus westermanni, *Lütken, in Naturhist. Foren. Vidensk. Meddel.* 1862, Nov. 29, tab. 1. fig. 5.

Rostral shield exceedingly large, covering nearly the whole of the upper surface of the head; it has a sharp edge in front, which is slightly bent downwards and produced into a rather acute point; it is so much dilated that its lateral margin touches the nostril and the eye; the portion situated at the lower surface of the snout is slightly concave. All the other shields appear to be narrow, as each shield overlaps a great portion of the shield behind it; consequently the eye is visible from below the fronto-nasal, this shield covering a large portion of the ocular*. Fronto-nasal with the posterior margin undulated, not extending so far backwards as the rostral. Præocular situated behind the lower portion of the fronto-nasal, ocular behind its upper portion. A narrow, crescent-shaped supraocular behind each posterior corner of the rostral. There is a subocular plate, nearly as large as the ocular, behind the præocular, below the ocular and above the two hinder labials. Labials four: the first touches the rostral and nasal, the second the nasal, fronto-nasal and præocular, the third and fourth the subocular. The frontal and parietal scales scarcely differ from one another in shape and size, and are nearly twice as broad as the scales of the body.

The body is only a little thicker behind than in front; its circumference in the middle is contained fourteen times in the total length. The tail is slightly curved, extremely short, its length being equal to (or, in females, less than) the width of the head; it terminates in a minute spine. Body surrounded by twenty-eight or twenty-nine longitudinal series of scales. I count 500 transverse series (466, *Bibr.*); ten round the tail.

Light bronze-coloured, each scale on the back lighter in the centre; below uniform yellowish.

This species is one of the best-marked Blindworms in India; we have received specimens from Madras, from the Anamallay Mountains, and from the Deccan. It attains to a length of 16 inches.

The three views of the head represent it of twice its natural size.

* This may lead to a misinterpretation of the head-shields, as in the case of *Onychocephalus westermanni*, where Dr. Lütken takes the fronto-nasal which overlaps the ocular, for the ocular itself. *Bibron* very well describes the arrangement of the shields: "La plaque préoculaire, vu son peu de hauteur, ne sépare la fronto-nasale et l'oculaire l'une de l'autre, que dans les deux tiers inférieurs de leur étendue verticale."

FAMILY OF SHORT-TAILS—*TORTRICIDÆ*.

Body cylindrical, with a depressed, rounded head not distinct from neck ; tail extremely short, conical, with its extremity smooth. Rudiments of hind limbs are hidden in a small groove on each side of the vent. The body is covered with rounded, polished, imbricate scales of moderate size, those in the ventral series being but little larger than the rest. Only one pair of frontals ; six upper labials. Eye small. Cleft of the mouth of moderate width ; teeth of the jaws in small number, rather stout, subequal in size ; palatine teeth present. A longitudinal fold at the chin.

The species occurring in the East Indies belong to one genus only.

CYLINDROPHIS, *Wagler*.

Nostrils in a large undivided plate which forms a suture with the other nasal behind the rostral. Occipitals small. Eye small, with round pupil, surrounded by a supraorbital, a postocular, two labials, and the frontal ; only one pair of frontals. No intermaxillary teeth.

Two of the three species known are inhabitants of British India, the third (*C. melanotus*) being, apparently, peculiar to the island of Timor. They are extremely similar to one another, differing merely in coloration and in the form of the head, whilst the arrangement of the shields of the head is the same.

The head is depressed, scarcely distinct from the neck, with the cleft of the mouth extending backwards behind the occipitals. Eye small, more or less directed upwards ; trunk cylindrical ; tail extremely short, conical, terminating in a horny, conical, smooth scale. Rostral shield low, not extending far backwards. The two nasals are rather large, forming together a suture behind the rostral ; their anterior outer portion is pierced by the nostril. Only one pair of large frontals, entering the orbit ; a vertical ; a supraorbital, which is as large as, or even larger than, the small occipitals. Six upper labials, the third and fourth of which form the lower part of the orbit ; a very distinct postocular, followed by a very large temporal, behind which are situated two pairs of scale-like temporals. Mental shield small, triangular : five or six lower labials ; the first pair form a suture together behind the mental shield. One pair of chin-shields, separated by a deep groove from each other ; three pairs of labials are in contact with the chin-shields. Scales smooth, polished, rounded, without apical groove, in nineteen or twenty-one series. The ventral shields scarcely differ in size from the other

scales in the anterior part of the body, and become somewhat larger posteriorly; anal bifid; subcaudals narrow, simple.

The *Cylindrophides* are burrowing animals, only occasionally found above ground; they feed on insects, worms, and small mammals living in earth-holes.

Width of the interocular space more than the length of the snout . . . *C. rufus*.
Width of the interocular space equal to the length of the snout . . . *C. maculatus*.

Note.—Mr. Jerdon (*Journ. As. Soc. Beng.* xxii. p. 527) mentions two *Cylindrophides* occurring in the Peninsula of India, and adds the following characters (!):—

"*C. curticeps*. Differs from *C. maculatus* (?) in its shorter, more triangular head, &c. &c."

"*C. macroscelis**. Differs from both in the much larger scales."

Very probably these new species of Mr. Jerdon will turn out not to be *Cylindrophides* at all.

CYLINDROPHIS RUFUS.

Anguis rufus, *Laur. Syn. Rept.* p. 71.

Schilay Pambou, *Russell, Ind. Serp.* ii. pl. 28.

Anguis scytale, *Russell*, ii. pl. 27.

Cylindrophis resplendens, *Wagl. Ic. Amph.* tab. 5. fig. 1.

Tortrix rufa, *Schleg. Phys. Serp.* p. 128. pl. 1. fig. 1-3.

Cylindrophis rufus, *Gray, Zool. Misc.* p. 46. *Cantor, Mal. Rept.* p. 53.

Head depressed, broad, short, its width between the eyes being more than the length of the snout. Vertical shield as broad as long, subtriangular, not larger than a supraorbital. Ventral shields scarcely larger than the scales of the adjoining series. Scales in nineteen or twenty-one series. Ventrals 184-200; subcaudals 6-9. Brown or black; belly with irregular white cross bands, extending more or less up the sides; the first of these cross bands is behind the angle of the mouth, frequently extending near to the median line of the back, and forming an interrupted collar. Sometimes a white spot on each frontal. This spot, the collar, and the lower part of the tail are bright vermillion during life.

This species attains to a length of 30 inches, and is found in many islands of the East Indian Archipelago (Java, Borneo), in Gamboja, at Singapore, and on the coast of Tranquebar. The differences in the number of the scales and in the coloration do not depend on the various localities, and therefore are not indicative of different specific forms.

CYLINDROPHIS MACULATUS.

Anguis maculatus, *L. Syst. Nat.* i. p. 391. *Russell, Ind. Serp.* ii. p. 33. pl. 29.

Cylindrophis maculatus, *Wagl. Syst. Amph.* p. 195.

Tortrix maculata, *Oppel, Rept.* p. 56. *Schleg. Phys. Serp.* ii. p. 12. pl. 1. figs. 6 & 7.

Head depressed, oblong, its width between the eyes being equal to the length of the snout.

* *Quere macrolepis*?

Vertical shield longer than broad, pentagonal, smaller than a supraorbital. Ventral shields not much larger than the scales of the adjoining series. Scales in 21 series. Ventrals 186-196; subcaudals 5-6. The body is brown above and white below, and encircled by a network of black lines and bands; the longitudinal parts of the network are a black vertebral line and an irregular band along each side; the transverse bands on the back are narrow, those on the belly broad; the head and the neck are black; a white collar behind the black part of the neck. An oblique white band descends from the occipital to the throat.

It attains rarely to the length of 2 feet, and is found only in Ceylon.

FAMILY OF XENOPELTIDES—*XENOPELTIDÆ*.

Body cylindrical, with a depressed, rounded head not distinct from neck; tail short, tapering; no rudiments of hind limbs. Scales rounded, polished, rather large; ventral shields well developed. Two pairs of frontals; occiput covered by five shields. Eye small, with subvertical pupil. Cleft of the mouth of moderate width. Teeth numerous in the jaws and on the palate; no longer tooth; a longitudinal fold at the chin.

Only one genus.

XENOPELTIS, *Reinwardt*.

Upper labials eight; præocular large, replacing the loreal; occiput covered by five shields; scales in fifteen rows; anal and subcaudals bifid.

Only one species is known.

XENOPELTIS UNICOLOR.

Xenopeltis unicolor, concolor, et leucocephalus, *Reinw. Iris*, 1827, p. 564.

Tortrix xenopeltis, *Schleg. Phys. Serp.* ii. p. 20. pl. 1. figs. 8-10.

Xenopeltis unicolor, *Cantor, Mal. Rept.* p. 54.

The head of this snake is flat, depressed, obtusely rounded in front; the eye small, with subvertical pupil; the body cylindrical; the tail tapering, short.

Rostral shield broader than high, slightly recurved on the upper surface of the snout, with an obtuse superior angle. The anterior frontals are about half the size of the posterior, and rather broader than long; the posterior frontals are longer than broad, five-sided, their inner and præocular margins being the longest. Vertical five-sided, with an acute angle behind, and with the hinder sides longest. Supraorbital small, not much larger than the eye. The occipital region is covered by five shields, viz. by an anterior pair, by a posterior pair, and by a central shield; the shields of the anterior pair and the central one resemble the vertical in form and size. The nasal shield is rather small, oblong, and divided into two by a transverse suture, on which the nostril is situated. The præocular is very large, forming a long suture with the posterior frontal, and a shorter one with the vertical. Postoculars two, equal in size and form. Eight upper labials, the fourth and fifth of which are produced upwards to form the lower part of the orbit together with the lower postorbital. Six scale-like temporals arranged in two series descending obliquely forwards; two are in contact with the postoculars. The mental shield is rather broader than long, with a slight median groove; the first pair of lower labials form a suture together behind the rostral; one pair of chin-shields, which are longer than broad, and separated by a longitudinal groove. Seven lower labials, three of which are in contact with the chin-shield, and the third of which is longer than the second.

The circumference of the body is equal to the length of the tail, and one-tenth or one-eleventh of the total length; it is surrounded by fifteen longitudinal series of smooth, poreless, polished scales, those of the outer series being much larger than the others. Abdominal shields about 180; anal bifid; subcaudals bifid, 27.

Old specimens are uniform brown or blackish above, and white below; young individuals have a white head, and this part is frequently of a lighter coloration even in older examples. Light lines run along the joining edges of the series of scales, but disappear nearly entirely with age.

The cleft of the mouth is of moderate width, and the mandibles cannot be moved much from each other; there are forty closely set teeth of equal size on each side of the upper jaw, and as many in the lower. The palatine teeth are rather stronger and more widely set, twenty-six in number.

This snake attains to a length of 3-4 feet; we have received it from Pinang and Singapore, from Gamboja, Sumatra, Java, Celebes, and Borneo. It is a nocturnal species and of fierce habits, feeding on small mammals, which it hunts for in their subterranean holes.

FAMILY OF ROUGH-TAILS—*UROPELTIDÆ*.

Body cylindrical, with a short, narrow head not distinct from neck; tail extremely short, truncated or scarcely tapering, generally terminating in a rough, naked disk, or covered with keeled scales (see *Melanophidium*). The body is covered with rounded, polished, imbricate scales, those in the ventral series being always somewhat larger than the rest. Only one pair of frontals; four upper labials. Eye very small. Cleft of the mouth of moderate width; teeth in small number, small, subequal in size, in the maxillary and mandibular bones, none on the palate. There is no longitudinal fold at the chin, except in *Melanophidium*. No rudiments of hinder extremities.

This family, founded by J. Müller, contains forms which, from the simplicity of the shields of their head, from their scales, their short tail, and their but little dilatable mouth, bear some resemblance to the *Typhlopidae*. They also, like the Typhlopes, live under ground,—their conical head, followed by a generally very stout neck, their rigid body, and, above all, their short, strong, and posteriorly shielded tail being admirably adapted for burrowing. The species are very similar to one another, so that a general description will suffice for all.

The head is always narrower than the neck, which is generally slightly swollen and the thickest part of the trunk. Very frequently the longitudinal axis of the head is not the same as that of the neck, the head being impressed on one side, as if it had been dislocated during some effort of the snake to penetrate the soil. The rostral shield is conical, frequently pointed, and sometimes (*Rhinophis*) extending backwards to the frontals, entirely separating the nasals from each other. The nasal is large, pierced inferiorly by a nostril which is situated on the side of the head; the nasal is in contact with the first and second labials. Only one pair of frontals, in contact with second and third labials; a six-sided vertical, the lateral margins of which are sometimes extremely short; a pair of well-developed occipitals, in contact with the fourth labial. The eye is very small, and covered by a separate shield in *Plectrurus* only, where also a supraorbital and postocular can be distinguished, the eye resting on the third labial; in the other species these shields are confluent, forming an ocular, the eye being visible from behind a transparent portion of the ocular. The labials increase in size backwards, the last forming a broad suture with the occipital.

The scales are short, rounded, polished, without apical groove, rather larger in the ventral series than in the dorsal; a series of narrow ventral shields* becomes distinct at a short distance behind the throat; the vent is covered by a bifid anal. The subcaudals are scale-

* In counting the ventral shields I have always commenced from the first scale behind the mental shield.

like, sometimes in a double series, sometimes confluent and forming only one series—which does not appear to be a specific character; they are few in number, from four to twelve.

The species do not attain to a considerable size, and hitherto they have been found only in Ceylon and in the Peninsula of India. They are by no means scarce, but escape observation from their peculiar mode of life. In order to collect them it is necessary to dig for them to a depth of 4 feet. According to Peters they are viviparous (*Rh. melanogaster*). They live on insects and worms.

Synopsis of the Genera.

Nasals separated by the rostral	<i>Rhinophis</i> , p. 183.
Tail terminating in a flat, rough, scaleless shield	<i>Uropeltis</i> , p. 188.
Hind part of the tail covered with keeled scales; supraorbital and postocular confluent	<i>Silybura</i> , p. 189.
Supraorbital and postocular distinct	<i>Plectrurus</i> , p. 192.
Tail covered with smooth scales, terminating in a small, smooth, horny point	<i>Melanophidium</i> , p. 193.

RHINOPHIS, Hemprich.

Tail cylindrical, covered with smooth scales, terminating in a convex, scaleless, rough shield. Head conical; nasal shields separated from each other by the rostral, which is produced backwards; supraorbital and postocular confluent into one shield. Tail of the male longer than of the female.

Found in Ceylon only.

Synopsis of the Species.

- * Rostral shield nearly half as long as the head, with a longitudinal keel above.
 - Body nearly uniformly coloured *Rh. oxyrhynchus*, p. 184.
 - Yellowish, with series of black dots *Rh. punctatus*, p. 184.
- ** Rostral shield not half as long as the head, without distinct keel; caudal shield large.
 - Coloration uniform or with some white blotches on the front part of the trunk *Rh. philippinus*, p. 184.
 - A series of triangular white spots along each side of the body . . . *Rh. trevelyani*, p. 185.
 - Belly and sides red, with black spots *Rh. sanguineus*, p. 186.
- *** Caudal shield very small.
 - Snout pointed *Rh. blythii*, p. 186.
 - Snout obtuse *Rh. pulneyensis*, p. 187.

RHINOPHIS OXYRHYNCUS.

Typhlops oxyrhynchus, *Schneid. Hist. Amph.* ii. p. 341.

Rhinophis oxyrhynchus, *Hempr. Grundriss Naturgesch.* p. 119. *Dum. & Bibr.* vii. p. 154. *Peters, Uropelt.* p. 9. tab. 2. fig. 1.

Dapataaya lankadivana, *Kelaart, Prodr.* ii. p. 16.

Mytilia unimaculata, *Gray, Proc. Zool. Soc.* 1858, p. 264.

Snout acutely pointed; rostral shield nearly half as long as the head, compressed into a distinct longitudinal keel above; vertical as broad as long, or even broader. Caudal shield large, obtusely convex, extending on to the lower surface of the tail, its extent being about equal to that of the head. Anterior part of the trunk surrounded by nineteen, the remainder by seventeen longitudinal series of scales; ventral shields not much larger than the scales of the adjoining series, varying in number from 214 to 223; male with seven or eight, female with six subcaudals, which are partly simple, partly divided into two. Brownish, each scale with a lighter margin; anal shields, and sometimes a spot on the upper or lower part of the tail, white; caudal shield brown.

Our largest specimen is 15 inches long, the circumference of the thickest (anterior) part of the trunk being one-thirteenth or one-fourteenth of the total length. The species is a native of Ceylon, and, according to Kelaart, common at Trincomalee and in the Kandyan Province, where it is found two or three feet under ground and in ant-hills.

RHINOPHIS PUNCTATUS.

Rhinophis punctatus, *Müller, Treviran. Zeitschr. Physiol.* iv. p. 248. *Dum. & Bibr.* vii. p. 157. *Peters, Uropelt.* p. 12. tab. 2. fig. 3.

Pseudotyphlops oxyrhynchus, *Schleg. Abbild.* p. 43. tab. 12.

Snout acutely pointed; rostral shield nearly half as long as the head, compressed into a distinct longitudinal keel above; vertical as broad as long. Caudal shield large, rather flat, extending on to the lower surface of the tail. Scales in seventeen longitudinal series; ventral shields not much larger than the scales of the adjoining series, 228 in number; seven or eight subcaudals. Yellowish, each scale with a black or brown central spot; the scales in the series adjoining the vertebral series without spot.

This species attains to a length of 19 inches, and appears to be one of the scarcest Ceylonese snakes.

RHINOPHIS PHILIPPINUS.

Typhlops philippinus, *Cuv. Règne Anim.*

Rhinophis philippinus, *Müll., Treviran. Zeitschr. Physiol.* iv. p. 249. *Dum. & Bibr.* vii. p. 154. tab. 59. fig. 1. *Peters, Uropelt.* p. 15.

Snout acutely pointed; the length of the rostral shield is much less than one-half of that

of the head; it is scarcely compressed above. Caudal shield large, obtusely convex, extending on to the lower surface of the tail, its extent being rather more than that of the head. Anterior part of the trunk surrounded by nineteen, the remainder by seventeen longitudinal series of scales; ventral shields not much larger than the scales of the adjoining series, varying in number from 156 to 174; six entire subcaudals in the male, four divided ones in the female. Blackish olive, each scale with a lighter margin; preanal scales white; sometimes some white blotches on the front part of the trunk.

This species usually attains to a length of from 10 to 11 inches, the circumference of the thickest (anterior) part of the trunk being one-ninth or one-tenth of the total length; however, I have seen an example, from Sir Andrew Smith's collection, which is $16\frac{1}{2}$ inches long. It is found in Ceylon, and not in the Philippine Islands as stated by the French zoologists.

Professor Peters has described another species of *Rhinophis*, *Rh. planiceps* (Uropelt. p. 17. tab. 1. fig. 9); it is founded on a specimen which we received from Ceylon with *Rh. philippinus*, from which, in my opinion, it does not differ specifically. The depression, or rather impression, of the head is not a specific character, as we often find it in some specimens of a species whilst it is absent in others, and the greater breadth of the vertical shield appears to me to be an individual peculiarity. In some specimens of *Rh. philippinus* that shield is longer than broad, in others as broad as long, and in the typical specimen of *Rh. planiceps* it is broader than long. No other differences are observable. If my opinion should be found to be correct, the name of *planiceps* might be substituted for *philippinus*, as the latter term conveys a serious error.

RHINOPHIS TREVELYANUS.

Dapatnaya trevellyana*, *Kelaart, Prodr.* ii. p. 17.

Mitylia gerrardi, *Gray, Proc. Zool. Soc.* 1858, pp. 58, 263. tab. 13.

Rhinophis homolepis, (*Hemprich*) *Peters, Uropelt.* p. 14. tab. 2. fig. 2.

Snout acutely pointed; the length of the rostral shield is much less than one-half of that of the head; it is slightly compressed above into a rather indistinct, obtuse, longitudinal keel; vertical as broad as long, or rather longer. Caudal shield large, obtusely convex, extending on to the lower surface of the tail, its extent being rather more than that of the head. Anterior part of the trunk surrounded by nineteen, the remainder by seventeen longitudinal series of scales; ventral shields not much larger than the scales of the adjoining series, varying in number from 193 to 202; four or five subcaudals, partly simple, partly divided into two. Ventrals and subcaudals smooth. Upper parts black, the lower parts white, each scale with a black central spot; a series of triangular white spots along each side of the body; extremity of the tail white or whitish.

The largest specimen I have examined is 11 inches long, the circumference of the thickest (anterior) part of the trunk being one-twelfth or one-thirteenth of the total length. The species is a native of Ceylon, and found on the Kandyan Hills, three or four feet under ground.

* This is the first name under which this species has been described.

RHINOPHIS SANGUINEUS. (Plate XVII. fig. A.)

Rhinophis sanguineus, *Beddome, Proc. Zool. Soc.* 1863, p. 227.

— *microlepis*, *Beddome, l. c.* pl. 26. fig. 2.

Snout acutely pointed; the length of the rostral shield is one-third of that of the head; it is slightly compressed into a very obtuse longitudinal keel; vertical rather longer than broad. Caudal shield large, flattish in front, obtusely convex behind, scarcely extending on to the lower surface of the tail, its extent being rather more than that of the head. Foremost part of the trunk surrounded by nineteen, farther behind by seventeen, its middle by fifteen series of scales. Ventral shields 197, twice as large as the scales of the adjoining series; subcaudals partly entire, partly bifid, nine or ten in the male, six or seven in the female; the subcaudals, the hinder ventrals, and the scales in their vicinity are provided with from four to eight keels in the male sex. Uniform black above; belly with the three outer series of scales scarlet, many of the scales and ventral shields having a black spot. Caudal shield black, with a yellow median streak and with red outer margin. A large black spot on the lower side of the extremity of the tail.

Captain Beddome writes that he has procured numerous examples of this species at Cherambady in the Wynad, at an elevation of 3500 feet; all were dug up in one spot; and he has not met with it elsewhere. The specimen he sent is 13 inches long, and a male.

We have given two views of the head, a portion of the side of the body and of the belly, and the posterior view of the tail: all of the natural size.

RHINOPHIS BLYTHII.

Rhinophis blythii, *Kelaart, Prodr.* ii. p. 14. *Peters, Uropelt.* p. 17.

Mytilia templetonii, *Gray, Proc. Zool. Soc.* 1858, p. 263 (old age).

— *melanogaster*, *Gray, l. c.* p. 264 (male, not full-grown).

Plectrurus ceylonicus, *Peters, Monatsber. Berl. Acad.* 1859, p. 388.

Rhinophis melanogaster, *Peters, Uropelt.* p. 18, tab. 2. fig. 4.

Snout pointed; the length of the rostral shield is much less than one-half of that of the head; it is very slightly compressed above; vertical longer than broad. Caudal shield small, not of half the extent of the head. Anterior part of the trunk surrounded by nineteen, the remainder by seventeen longitudinal series of scales. Ventral shields not much larger than the scales of the adjoining series, varying in number from 150 to 169.

In other respects this species varies considerably:—

a. In specimens from 13 to 14 inches long (*Rh. blythii*) the circumference of the thickest part of the body is one-eighth of the total length; the extremity of the caudal shield is obtuse, with the keel which may be observed in younger individuals worn off. Subcaudals divided, from seven to nine. Brownish above; belly sometimes paler, sometimes blackish; a series of five or six triangular yellowish spots, united at the base by a more or less distinct

longitudinal band, along each side of the front part of the trunk; a yellowish ring round the root of the tail.

β. In female specimens from 9 to 10 inches long the circumference of the body is one-eleventh or one-twelfth of the total length. The caudal shield terminates below in a very indistinct transverse keel; six divided subcaudals. Brown above, black below, both colours being separated by an irregular yellowish lateral band, which is broken up into a series of spots on the front part of the trunk and more or less continuous posteriorly.

γ. In male specimens from 7 to 8 inches long (*Mytilia melanogaster*) the circumference of the body is one-tenth or one-eleventh of the total length. The caudal shield terminates below in a distinct transverse keel, with a minute spine on each side; nine or ten divided or entire subcaudals. Brownish above, with or without dark longitudinal lines; black below; an irregular yellowish longitudinal band along each side.

δ. In young specimens from $3\frac{1}{2}$ to 4 inches long the circumference of the body is one-seventh or one-eighth of the total length. The shield and the scales of the tail are as in the specimens described under γ. Greyish olive above, each scale with a blackish dot, the dots forming longitudinal series; belly and lower part of the sides uniform yellowish; each scale of the tail with a black central dot.

Having most carefully examined more than twenty specimens, besides the types of *Mytilia templetonii* and *Mytilia melanogaster*, I cannot arrive at any other conclusion than that these two forms are identical. The principal ground on which both have been separated is the form of the extremity of the caudal shield, which has a slightly spinose transverse keel in younger examples. This keel becomes indistinct with age, so that the extremity of the tail appears more rounded. The coloration of the belly, also, is not a distinctive character in one of the two supposed species; the British Museum possesses an old example with a rounded caudal shield without keel (as in *M. templetonii*) but with a black belly (as in *M. melanogaster*).

The variation in the comparative thickness of the body is dependent on age, and very remarkable. It appears, from my observations, that young specimens have a comparatively short body, whilst it becomes most slender in middle age; when the individuals have attained to their full length (13–14 inches) their body increases in thickness, and old individuals are easily distinguished by the stoutness of their habit.

This is the most common species of Ceylon.

RHINOPHIS PULNEYENSIS. (Plate XVII. fig. C.)

Plectrurus pulneyensis, *Beddome*, *Proc. Zool. Soc.* 1863, p. 228. pl. 25. fig. 2.

Snout rather obtuse; rostral shield rounded behind, short, its length being one-fourth of that of the head; it is flat above, not compressed; vertical as broad as long. Caudal shield very small, about as large as the rostral. Anterior part of the trunk surrounded by nineteen, its middle by seventeen rows of scales. Ventral shields twice as large as the scales of the adjoining series, 175 in number; subcaudals twelve in the male, from six to eight in the female. The circumference of the body is about one-tenth of the total length. Brownish

black: a yellow band commences from the labials, runs along each side of the front part of the body, and is continued as an interrupted series of transverse spots to the vent; the spots sometimes extend across the belly; a yellow band along each side of the tail, reaching across the vent.

It is very abundant on the Pulney Hills, at elevations of from 7000 to 8000 feet. A female which I have examined is $8\frac{1}{2}$ inches long, and has three eggs in its oviduct, each of which is 9 lines long.

We have given on Plate XVII. two views of the head and the side view of the tail, of the natural size.

UROPELTIS.

Uropeltis (part.), Cuvier.

Tail cylindrical, obliquely truncated as if severed by a knife; the truncated portion flat, scaleless, rough. Head conical; nasal shields forming a suture together behind the rostral; supraorbital and postocular confluent into one shield.

Ceylon.

Only one species is known.

UROPELTIS GRANDIS.

Uropeltis philippinus, Cuv. *Règne Anim. Dum. & Bibr.* vii. p. 161, pl. 59. fig. 2. *Peters, Uropeltis*. p. 20. *Tennent, Nat. Hist. Ceyl.* p. 302, c. fig.

— *saffraganeus, grandis, et pardalis, Kelaart, Prodr.* ii. pp. 15 & 16.

Snout pointed; rostral convex, produced and tapering behind, nearly as long as the vertical. Scales in twenty-three longitudinal series on the neck, in twenty-one in the middle of the body; ventrals 138–148; seven or eight pairs of bifid subcaudals. The circumference of the thickest (anterior) part of the body is one-seventh of the total length. The *adult* is uniform brown above; the lateral scales and ventral shields brown, with a broad yellowish margin. Young specimens sometimes with numerous irregular white spots. Another half-grown specimen is nearly uniform brown above and white below.

This snake is found near Adam's Peak and Matura, and is rare; it attains to a length of 20 inches, being the largest species of this family.

SILYBURA.

Silubours, Gray = Silybura, Peters.

Tail subcylindrical, the scales on its upper posterior side being shield-like and provided with one or several keels, forming together a flattish disk which terminates in a horny, bispinous, horizontal scale. Head more or less conical; nasal shields forming a suture together behind the rostral; supra-orbital and postocular confluent into one shield.

Peninsula of India.

Synopsis of the Species.

- * Scales in fifteen rows *S. macrolepis*, p. 189.
- ** Scales in seventeen rows; rostral longer than vertical *S. beddomi*, p. 190.
- *** Scales in seventeen rows; rostral shorter than vertical.
- Ventrals 199-203 *S. ocellata*, p. 190.
- The lower part of the tail is completely encircled by a yellow band;
ventrals 143-168 *S. elioti*, p. 190.
- A yellow band along each side of body and tail; vertical shield square *S. bicatenata*, p. 191.
- The fourth upper labial much longer than high; ventrals 139, nearly twice
as broad as the scales; tail with a yellow band only along the side *S. shortii*, p. 191.
- Ventrals 122 *S. brevis*, p. 192.

SILYBURA MACROLEPIS. (Plate XVII. fig. B.)

Silybura macrolepis, Peters, Monatsber. Berl. Acad. 1861, p. 904.

Snout obtusely conical; rostral shield without keel above, shorter than the vertical. Caudal disk flat, well defined, twice as long as broad; each scale of the disk with one or two keels. Scales of the middle of the body in fifteen rows; ventral shields 137; nine pairs of subcaudals. The circumference of the thickest part of the body is contained ten times and a half in the total length. Black: a broad, irregular, yellowish band along each side of the front part of the trunk; traces of a similar narrow band are visible along the sides of the body; a yellow band along each side of the lower part of the tail.

The single specimen known is a female, $10\frac{1}{2}$ inches long, and probably a native of the peninsula of India.

The head is represented in two views on Plate XVII.

Silybura beddomii. (Plate XVII. fig. F.)

Silybura beddomii, *Günth. Ann. & Mag. Nat. Hist.* 1862, January, p. 56.

Snout pointed; rostral shield compressed into a slight keel above, longer than the vertical. Caudal disk rather convex, not well defined, nearly as long as the tail, with two or three strong keels on each scale. Scales of the middle of the body in seventeen rows; ventral shields 178; from five to six pairs of subcaudals. The circumference of the thickest part of the body is one-eleventh of the total length. Brown: each scale on the sides with a pair of whitish dots; each ventral shield with a small whitish spot. A yellowish line along the side of the neck, commencing behind the angle of the mouth; vent and tip of the tail yellow.

This species was discovered by Captain R. H. Beddome in the Anamallay Hills and in the Nilgherries, at elevations of from 3000 to 4500 feet; the specimens are 11 inches long.

Two views of the head are given on Plate XVII., of its natural size.

Silybura ocellata. (Plate XVII. figs. E, E'.)

Silybura ocellata, *Beddome, Proc. Zool. Soc.* 1863, p. 226.

Snout pointed; rostral shield slightly compressed above, much shorter than the vertical. Caudal disk rather convex, twice as long as broad, not very clearly defined; each scale of the disk with three or four strong keels. Scales of the middle of the body in seventeen rows; ventral shields 199-203; subcaudals from eight to ten, in pairs or entire. The circumference of the thickest part of the body is one-twelfth of the total length. Ground-colour of the male yellowish olive, darker towards head and tail; of the female dull brownish; of the young dark purplish brown: all with numerous, closely-set, rather irregular transverse series of yellow, black-edged ocelli; the ocelli are small, always two on each side of the back; a series of irregular, transverse, yellow, black-edged spots along each side of the belly corresponds to these bands. Belly brownish.

This species was discovered by Captain R. H. Beddome at Walaghat, on the western slope of the Nilgherries, at an elevation of 3500 feet, in dense moist forests. The specimen sent by him is a male, 14½ inches long. Figures E, E' on Plate XVII. represent the head in two different views, a portion of the side of the body, and the caudal disk: all of the natural size.

Silybura elliotti.

Uropeltis ceylanicus, *Cuv. Règne Anim.*

Siluboura ceylanica, *Gray, Lizards*, p. 142.

Coloburus ceylanicus, *Dum. & Bibr.* vii. p. 164. tab. 59. fig. 3.

Siluboura elliotti, *Gray, Proc. Zool. Soc.* 1858, p. 262.

Silybura ceylanica, *Peters, Monatsber. Berl. Acad.* 1861, p. 903.

— *nilgherriensis*, *Beddome, Proc. Zool. Soc.* 1863, p. 226. pl. 26. fig. 1.

Snout more or less obtusely conical; rostral shield without keel above, shorter than the

vertical. Caudal disk flattened in females, convex and ill defined in males, twice or more than twice as long as broad; each scale of the disk with two or three strong keels. Scales of the middle of the body in seventeen rows; ventral shields 168 in a male (*S. elliotti*, Gray), 143-154 in females; the number of the subcaudals, which are divided, varies between seven and twelve, irrespectively of sex. The circumference of the thickest part of the body is one-tenth of the total length. Blackish brown above and below; a narrow yellowish streak runs from the angle of the mouth along each side of the neck; sometimes there are irregular small yellowish spots along the sides and on the back; the lower part of the tail is completely encircled by a yellow band.

This species attains to a length of 11 inches. All the specimens I have seen are from the Southern Peninsula (from the neighbourhood of Madras and from the Deccan); none are from Ceylon, as has been stated by some herpetologists.

SILYBURA BICATENATA. (Plate XVII. figs. H, H'.)

Snout obtusely conical; rostral rounded, very short, shorter than the nasals; vertical square, its front part, which extends between the frontals, being as large as its hind part; it is rectangular anteriorly and posteriorly. Fourth upper labial as high as long. Caudal disk flat, well defined, not much shorter than the tail, terminating in a broad, horny, bicuspid scale which is slightly turned upwards; each scale composing the caudal disk is provided with one or two or three keels. The body is surrounded by seventeen series of scales on the neck as well as in its middle; ventral shields 135; twelve pairs of subcaudals. The circumference of the thickest (anterior) part of the body is one-eleventh of the total length. Black above and below, each scale on the back with a yellowish margin. A yellow band runs along each side of the body; it corresponds to the joining edges of the fourth and fifth outer series of scales; anteriorly it is broken up into a series of large spots, posteriorly it flanks the lower part of the tail. Lower parts entirely black.

A single example of this beautiful species, $9\frac{1}{2}$ inches long, was brought by Colonel Sykes from the Deccan. The specimen is a male, with the tail 8 lines long; it is figured on Plate XVII. of its natural size; figure H' represents the upper side of the head.

SILYBURA SHORTII. (Plate XVII. fig. G.)

Silybura shortii, *Beddome, Proc. Zool. Soc.* 1863, p. 225. pl. 25. fig. 1.

Snout not conical, rather obtuse in front, depressed; eye comparatively large; rostral rounded, short, shorter than the nasal; vertical hexagonal, its anterior and posterior angles being nearly right ones. Fourth upper labial much longer than high. Caudal disk flat, well defined, not quite twice as long as broad, and not much shorter than the tail, terminating in a broad, horny, bicuspid scale. Each scale composing the caudal disk is provided with two or three strong keels. Seventeen rows of scales round the middle of the body;

ventral shields 139, nearly twice as broad as the scales of the adjoining series; nine pairs of subcaudals. The circumference of the thickest part of the body is one-tenth of the total length. Black; numerous irregularly disposed scales are white; an irregular white band from the angle of the mouth along each side of the front part of the trunk; a yellowish band along each side of the tail, not joined over the vent.

I have examined the single specimen to which Captain Beddome has assigned the name of its discoverer; it was found in the Shevaray Hills, at an elevation of 4500 feet; it is 8 inches long.

We have given two views of the head, of its natural size, taken from the same (typical) specimen as that which served for the drawings in the 'Proceedings' of the Zoological Society.

SILYBURA BREVIS. (Plate XVII. fig. D.)

Silybura brevis, *Günth. Ann. & Mag. Nat. Hist.* 1862, January, p. 56.

Snout obtuse; rostral shield rounded, shorter than the vertical. Caudal disk well defined, flat, nearly as long as the tail; each scale of the disk with two strong keels. Scales of the middle of the body in seventeen rows; ventral shields 122; nine pairs of subcaudals. The circumference of the thickest part of the body is contained six times and a half in the total length. Brown above; the lower part of the sides and the belly yellowish, densely marbled with brown; sides of the throat yellowish, immaculate; the lower part of the tail black, with a broad white band on each side.

The single specimen I have seen is $6\frac{1}{2}$ inches long, and apparently young. It was brought by Captain R. H. Beddome from the Anamallay Hills; he informs me that he has lately found a second example in the Nilgherries, which is rather smaller than the one described. We have given an entire figure of the typical specimen, and two views of the head.

PLECTRURUS.

Plectrurus, *Dun. & Bibr.*

Maudslayi, *Gray, Proc. Zool. Soc.* 1858, p. 261.

Posterior part of the tail compressed, covered with obtusely keeled scales, and terminating in a horny bicuspid scale, the two points being placed one above the other. Head conical; the nasals form a suture together behind the rostral; supraorbital and postocular distinct.

Peninsula of India.

Uniform brown	<i>P. perrotetii.</i>
Purple, with triangular yellow lateral spots	<i>P. güntleri.</i>

PLECTURUS FERROTETII.

Plecturus ferrotetii, *Dum. & Bibr.* vii. p. 167. pl. 59. fig. 4.

Snout obtusely conical; rostral shield short, rounded, as long as a nasal; vertical elongate, produced behind, much longer than broad. Body with fifteen series of scales round its middle; ventrals nearly twice as broad as the scales of the adjoining series, 161-162 in number; eight pairs of subcaudals. The circumference of the body is one-eleventh or one-twelfth of the total length. Uniform brownish or blackish.

This species is common in the Madras Presidency and in the Nilgherries; it attains to the length of 14 inches. It is found at an elevation of from 7000 to 8000 feet, and is frequently dug up in gardens or taken from under turf and stones.

PLECTURUS GÜNTHERI.

Plecturus güntheri, *Beddome, Proc. Zool. Soc.* 1863, p. 228. pl. 27 (the ground-colour is too dark in this figure, owing to the fault of the colourer).

Head flat above, with obtuse snout; rostral shield as high as broad, considerably shorter than a nasal, with a right angle behind. Vertical elongate, produced behind, nearly twice as long as broad. Body with seventeen series of scales round its foremost part, and with fifteen round its middle. Ventrals nearly twice as broad as the scales of the adjoining series, 172-175 in number; twelve pairs of subcaudals. The circumference of the body is one-twelfth or one-thirteenth of the total length. Beautiful purple above, each scale with a lighter margin; belly yellow, the yellow colour rising up on the sides in triangular markings, which are alternate with similar markings of the colour of the back, the purple spots sometimes joining those of the other side by narrow stripes crossing the belly.

This fine species was discovered by Captain R. H. Beddome in the moist forests at Walaghat, on the western slopes of the Nilgherries (3500 feet); the specimen which he sent is 14 inches long.

MELANOPHIDIUM, *Gthr.*

Tail slightly compressed, covered with smooth scales, and terminating in a very small, smooth, horny point slightly turned upwards. Snout rather obtuse; nasal shields forming a suture together behind the rostral; supra-orbital and postocular confluent into one shield. A median groove along the chin.

Only one species is known.

MELANOPHIDIUM WYNANDENSE. (Plate XVII. figs. I, I'.)

Plectrurus wynandensis, *Beddome, Proc. Zool. Soc. 1863*, p. 228.

Snout obtuse. Rostral shield rather small, simply convex, as high as broad; nasals large, forming a broad suture behind the rostral. Vertical hexagonal, longer than broad, with an obtuse anterior and a pointed posterior angle; occipital as large as vertical. The first pair of lower labials form a suture together behind the median shield; a pair of chin-shields. Scales in fifteen rows. Ventrals 180, thrice as broad as the scales of the adjoining series; anal large, bifid; subcaudals in twelve pairs. Body rather slender, the circumference of its thickest part being one-fifteenth of the total length. Black; posterior two-thirds of the belly irregularly black and white.

A specimen, 9 inches long (tail half an inch), was found at Wynand, at an elevation of 3500 feet; we have figured it of its natural size, figures I' representing the head in two different views.

FAMILY OF DWARF SNAKES—*CALAMARIDÆ*.

Body cylindrical, rigid, with a short head which is not distinct from neck; tail more or less short, tapering. Body and tail covered with rounded, smooth or keeled scales, which are not much imbricate, and disposed in from thirteen to seventeen longitudinal series. The ventral shields are well developed, and generally less than 200 in number; anal entire in all the Indian species; subcaudals two-rowed or entire. Cleft of the mouth rather short; nostril lateral; eye rather small, with round pupil. The normal number of shields of the head is always reduced by two or more shields being confluent. Chin with a longitudinal fold. All the Indian species have the maxillary teeth equal in size, none being grooved; palatine teeth present.

The snakes of this family are very small species, measuring between 12 and 24 inches in length; they are always found on the ground, beneath stones, fallen trees, or turf; their diminutive size, narrow cleft of the mouth, and very limited capability of extending the skin of the throat and trunk prevent them from attacking other reptiles, and their food appears to consist chiefly of insects and worms; more frequently they themselves fall an easy prey to other snakes, especially to the *Bungari* and *Callophides*, which inhabit the same localities. They are very gentle and never attempt to bite.

The Indian species belong to the following genera :—

* *Subcaudals bifid.*

† *Only one pair of frontals.*

Four or five upper labial shields *Calamaria*, p. 195.

Eight upper labial shields *Macrocalamus*, p. 198.

†† *Two pairs of frontals.*

Loreal none, replaced by the posterior frontal; a præocular *Oxycalamus*, p. 199.

Loreal and præocular united into one elongate shield *Geophis*, p. 200.

** *Subcaudals entire.*

Scales smooth *Aspidura*, p. 202.

Scales keeled *Haplocercus*, p. 204.

CALAMARIA, Boie.

Body cylindrical, stout or slender; head short, slightly depressed, not distinct from neck; eye of moderate size, with round pupil; tail short. Only one pair of frontals; nasal simple, small; loreal none, united with the frontal; one anterior ocular (sometimes absent) and one posterior; four or five labials. Scales smooth, rounded, polished, in thirteen series; anal entire; subcaudals two-rowed. Teeth equal in size and structure.

The snakes of this genus are peculiar to the East Indian archipelago, where they are represented by numerous species, a few only being found in the neighbouring parts of the continent (Malayan peninsula, Siam); they are entirely absent in the peninsula of India and in Ceylon. They are all ground snakes, and are very small, not much exceeding 12–15 inches in length, of diurnal habits, feeding on small invertebrates, and frequently falling a prey to more powerful snakes, particularly to the Elapes. They much resemble one another in every part of their organization: the head-shields are reduced in number; the rostral is low; the frontals large, always replacing the loreal, and sometimes even suppressing the præocular, forming a portion of the orbit; vertical large, supraorbital small; the occipital forms a suture with the last labial, a single temporal fitting-in in the notch between these two shields. Four or five labials, the hinder of which is the largest; if there are four, the second is larger than the first and third; two labials enter the orbit. Mental shield much broader than long; five pairs of lower labials, the first pair forming a suture behind the mental shield in some species, whilst in others the mental is in immediate contact with the anterior chin-shields. Two pairs of chin-shields, the anterior of which is larger than the posterior; sometimes a small azygos shield is intercalated between the posterior chin-shields, separating them entirely from each other,—a character which is also used for the distinction of the species.

The following species occur on the continent of India :—

- * Upper labials four; the first pair of lower labials form a suture together.
 Ventral shields bicoloured, 179-190 *C. siamensis*, p. 196.
 Ventral shields uniform whitish, 136-145 *C. quadrimaculata*, p. 197.
- ** Upper labials five; the first pair of lower labials are separate from each other.
 Brown, with four vermilion (white) streaks *C. albiventer*, p. 197.
- *** Upper labials five; the first pair of lower labials form a suture together.
 Head light brownish; vertical shield as broad as long *C. nigro-alba*, p. 198.
 Head white; vertical shield broader than long *C. leucocephala*, p. 198.

Some other species of *Calamaria* appear to have been discovered on the Indian continent, but unfortunately they have not been sufficiently well characterized to enable us to admit them into the system. It is even doubtful whether they belong to the genus *Calamaria* :—

1. *CALAMARIA CATENATA*, Blyth, *Journ. As. Soc. Beng.* 1854, p. 287.—No anterior frontals; the vertical plate broad, pentagonal, and almost as large as the occipitals; 13 rows of scales: scuta 187; scutella 41 pairs. Predominant colour dusky above, formed by minute black specks upon a pale ground tint; below pale buff with an iridescent lustre, and marked with lateral series of square black spots, chiefly upon alternate scuta. Four black lines throughout above, the upper bordering a pale medial streak, which is simple upon the tail, but along the body forms a concatenation of elongated oval spots. An imperfect whitish-buff collar, and similar marks before and behind the eye. Length of specimen 17 inches, of which the tail is $2\frac{1}{2}$ inches. From Assam.

2. *CALAMARIA RETICULATA*, Blyth, *Journ. As. Soc. Beng.* 1854, p. 287.—Vertical plate hexagonal, angulated to the front, and not half so large as the occipitals; supraorbital large and subtriangular. Thirteen rows of scales: scuta 136-138; scutella 27-28 pairs. Colour shining dull black, brilliant and iridescent below; minute yellowish-white specks on the side of the mouth, throat, and along the sides of the body. In spirit the edges of the scales are seen to be of a deep black, imparting a reticulated appearance. The larger of two specimens measures 12 inches, of which the tail is $2\frac{1}{2}$ inches. From Assam.

CALAMARIA SIAMENSIS. (Plate XVIII. fig. B.)

Upper labials four; the first pair of lower labials are in contact with each other; there is no azygos shield in contact with the anterior chin-shields. Vertical shield not much longer than broad or as broad as long, six-sided, much smaller than an occipital. The circumference of the body is one-sixteenth or one-eighteenth of the total length. Ventral shields 179-190; subcaudals 12-20. Brownish above, minutely dotted with black, uniform or with seven indistinct blackish lines; neck with a black collar, which has a more or less distinct whitish posterior margin; upper part of the tail with two or three pairs of white spots, one at its base, the other behind the middle and remote from its extremity, the third on its extremity; in females with a short tail there are only two pairs of these spots. Ventrals and subcaudals whitish, densely punctulated with brown, only the hind margins of the shields remaining immaculate.

Three specimens, from 8 to 9 inches long, were collected by Mouhot in the southern parts of Siam, and in the Lao Mountains, Cochinchina. We have given three views of the head, of twice its natural size, and a portion of the belly, to show its peculiar coloration.

CALAMARIA QUADRIMACULATA.

Calamaria quadrimaculata, *Dum. & Bibr.* vii. p. 73.

Upper labials four; the first pair of lower labials are in contact with each other; there is no azygos shield in contact with the anterior chin-shields. Vertical shield as broad as long, six-sided, half as large as an occipital. The circumference of the body is one-fourteenth of the total length. Ventral shields 136-145; subcaudals 13. Light brownish, with five or seven brown longitudinal lines; neck with a broad blackish-brown collar, edged with white anteriorly and posteriorly. Lower parts uniform white; a faint blackish subcaudal line. Upper part of the tail with two pairs of white spots, one at its base, and the other on its extremity.

This species is found in Java. Having seen a specimen from General Hardwicke's collection, it is possible that it occurs also in British India. For this reason, and for comparison with *C. siamensis*, we have admitted it in the present work.

CALAMARIA ALBIVENTER.

Changulia albiventer, *Gray, Ind. Zool.* c. fig.

Calamaria linnei, var., *Cantor, Mal. Rept.* p. 62.

— *albiventer*, *Günth. Colubr. Snakes*, p. 4.

Upper labials five; the first pair of lower labials are not in contact with each other; there is no azygos shield in contact with the hind part of the anterior chin-shields. The circumference of the body is one-twelfth or one-thirteenth of the total length. Ventral shields 160-166, subcaudals 16-17. Head brown, with darker dots; trunk brown, with four vermilion longitudinal streaks, the outer of which runs along the joining edges of the two outer series of scales; a third, rather indistinct, pair of streaks run along the joining edges of the third and fourth outer series of scales. Belly carmine, the brown coloration of the side just touching the margin of the ventral shields. A black serrated line along the middle of the subcaudals.

Pinang. Length 11 inches. The young specimens mentioned by Cantor appear to belong to another species.

CALAMARIA NIGRO-ALBA. (Plate XVIII. fig. C.)

Calamaria lumbricoidea, var., Cantor, *Mal. Rept.* p. 61 (not Boie).

Upper labials five; the first pair of lower labials are in contact with each other; there is no azygos shield in contact with the anterior chin-shields. Vertical shield as broad as long, six-sided, much smaller than an occipital, with an acute posterior angle. The circumference of the body is one-fourteenth or one-eighteenth of the total length. Ventral shields 147(-154)-166; subcaudals 30(-29)-25. Upper parts blackish, head somewhat lighter, all the lower parts and the outer series of scales whitish, immaculate, both colours being well defined; a faint blackish subcaudal line.

Pinang. Length 12-13 inches. This species has been confounded by Cantor with *C. lumbricoidea*, from Java, which differs in the arrangement of the labial shields. *C. modesta*, from Java, is more closely allied to our species, but differs in its coloration, and in having a greater number of ventral shields and a shorter tail. The three views of the head on Plate XVIII. are of twice the natural size, and are taken from one of Cantor's typical specimens.

CALAMARIA LEUCOCEPHALA.

Calamaria leucocephala, Dum. & Bibr. vii. p. 83.

Upper labials five; the first pair of lower labials are in contact with each other; there is no azygos shield in contact with the anterior chin-shields. Vertical shield broader than long, six-sided, with an obtuse angle posteriorly and anteriorly. Ventral shields 136; subcaudals 37. Black above; head, neck, the two outer series of scales, and the lower parts white.

The only specimen known is in the Fort Pitt Museum at Chatham, and is 9 inches long. It is probably from British India.

MACROCALAMUS, *Gthr.*

Body cylindrical, stout; head of moderate length, slightly depressed, not distinct from neck; eye of moderate size, with round pupil; tail short. Only one pair of frontals; nasal simple, nostril between nasal and first labial; loreal none, united with frontal; one anterior and one posterior ocular; eight upper labials. Scales smooth, rounded, polished, in thirteen series; anal entire; subcaudals two-rowed. Teeth equal.

East Indies.

MACROCALAMUS LATERALIS. (Plate XVIII. fig. D.)

Rostral shield depressed, longer than broad, extending on to the upper surface of the head; frontals bent downwards to the second and third labial shields; vertical indistinctly five-sided, longer than broad and smaller than the occipital; superciliary and præocular well developed and in contact with each other, the latter not extending on to the upper surface of the head; the nasal is as large as, and exactly above, the first labial, the nostril being between them; eight upper labials, the fourth and fifth forming the lower part of the orbit, and the seventh being the largest. One postocular; temporals 1+2. Mental shield very narrow in a transverse direction; six lower labials, the first pair forming a suture together behind the mental; four are in contact with the anterior chin-shields. Chin-shields two pairs: the anterior are nearly twice as long as broad, the posterior scale-like and entirely separated from each other by an intermediate azygos scale. Ventral shields 118; subcaudals 20. Brown: a dark-brown band, enclosing a regular series of whitish dots, runs along the side, bordering the belly; back with two series of indistinct brownish-black spots; an irregular series of very small black dots along each side of the belly, which is whitish; a blackish subcaudal band.

Total length 12 inches; head $\frac{1}{2}$ inch, tail $1\frac{1}{2}$ inch, circumference of the body $1\frac{1}{2}$ inch.

The only specimen known is from General Hardwicke's East Indian collection, and is probably from the continent. We have given three views of its head, of the natural size.

OXYCALAMUS, *Gthr.*

Body cylindrical, moderately stout; head narrow, pointed, not distinct from neck; eye of moderate size, with round pupil; tail rather short. Rostral very small; two pairs of frontal shields; two (?) very small nasals, nostril between; loreal none, replaced by the posterior frontal; one præ- and one post-ocular; five upper labials, the last in contact with the occipital. Scales smooth, in fifteen rows; anal entire; subcaudals two-rowed. Teeth equal.

Only one species.

OXYCALAMUS LONGICEPS.

Calamaria longiceps, Cantor, *Mal. Rept.* p. 63. fig. 1.

Rostral very small; anterior frontals half as large as posterior; vertical six-sided, longer

than broad, with an obtuse angle in front and a right angle behind. Occipitals narrow. Nasals!• Five upper labials: the first below the nasals; the second forming a suture with the posterior frontal; the third in contact with posterior frontal†, præorbital, and eye; the suture between third and fourth below the middle of the eye; the fourth in contact with the eye and posterior ocular; the fifth is the largest, and forms a long suture with the occipital; an elongate temporal shield along the hind part of the lateral edge of the occipital. The mental shield is in immediate contact with the chin-shields, separating the first pair of lower labials from each other. Two pairs of chin-shields, the anterior being very long. Ventral shields 131; subcaudals 26. Uniform brownish black.

The typical specimen is still unique, and preserved in the British Museum. Unfortunately it was very much dried when it arrived from India, so that it does not admit of an original description, although it proves, on comparing it with the figure given by Cantor, that the latter is correct in the main points. It was captured on the Great Hill of Pinang, and is $6\frac{1}{2}$ inches long, the head measuring $\frac{3}{8}$ inch, and the tail $\frac{5}{8}$ inch. The circumference of the body was $\frac{1}{16}$ inch.

GEOPHIS, *Wagler*.

Body cylindrical, stout or slender; head short, not distinct from neck; eye rather small, with round pupil; tail short or of moderate length. Two pairs of frontal shields; two small nasals, nostril between; loreal and præ-ocular united into one elongate shield; one or two posterior oculars; rostral small. Scales smooth, rounded, without apical groove, in thirteen, fifteen, or seventeen series; anal entire; subcaudals two-rowed. Teeth equal.

Species of this genus are found in tropical America and in the East Indies. One or two occur in British India.

GEOPHIS MICROCEPHALUS. (Plate XVIII. fig. A.)

Rhabdosoma microcephalum, Günth. *Cobubr. Snakes*, p. 12.

Body rather stout; tail rather short; head small, short, conical, not distinct from neck; eye small, with round pupil. Rostral shield small, grooved, extending upwards to the upper surface of the head; anterior frontals small, one-third the size of the posterior; the latter

* We cannot distinguish whether there are two minute nasals or whether they are confluent into one.

† Incorrect in Cantor's drawing.

six-sided, entering the orbit at its upper anterior angle. Vertical six-sided, as long as broad, with an obtuse anterior angle, and with a right one behind; its superciliary edges are as long as its anterior; occipitals twice as long as broad; superciliary small, postocular minute. One elongate shield, pointed behind, and broader in front, enters the orbit, and replaces the loreal and præocular. Nasals minute; six* upper labials: the first is minute, the third and fourth enter the orbit, the fifth is the largest. Temporal shields 1 + 2 + 3; sometimes the upper of the second and third series are confluent and form one elongate shield, situated along the side of the occipital. Mental shield very small; seven lower labials: the first, second, and third are very narrow, and nearly entirely suppressed by a single pair of very large chin-shields, which are twice as long as broad.

Scales in thirteen series; ventrals 148; subcaudals 26-30 in males, 17 in a female. Maxillary teeth 22; palatine 11; pterygoid 27.

Brown: back with three more or less distinct series of small dark spots; a blackish band with whitish edges runs along each side of the body, and is more distinct towards and on the tail than anteriorly; an oblique yellowish streak behind the angle of the mouth; belly nearly uniform brownish black, only the margins of the scutes remaining whitish. A variety is nearly uniform brown, with black belly; a few scales are whitish, the light spots forming a band on each side of the tail.

This species is found near Madras, and attains to a length of 17 inches.

Figure A of Plate XVIII. represents this species of its natural size; views of the lower side of the head and of the dentigerous bones of the upper jaw have been added.

Duméril and Bibron describe a small snake from the Nilgherries under the name of *Platypteryx perroteti* (vii. p. 501), which is evidently very similar to our species; indeed, we at first believed both to be the same, but on reconsideration it appeared too hazardous to identify them. Bibron assigns as the chief character of the genus *Platypteryx* the excessive breadth of the posterior portion of the pterygoid bone. This part is strong and concave in *G. microcephalus*; but although somewhat dilated, it must be much less so than in *Platypteryx*. Secondly, the postfrontal and third upper labial of *Platypteryx* touch each other before the eye, thereby excluding the loreal from the orbit. Finally, the belly of *Platypteryx* is whitish.

At all events, *Geophis microcephalus* and *Platypteryx perroteti* cannot be referred to two different genera; and if the latter genus be retained, its characters must be considerably altered.

* Five, as stated in my first description, if the last be not considered as a labial.

ASPIDURA, *Wagler*.

Body rather stout or moderately slender; head more or less narrow, not distinct from neck; eye small, with round pupil; tail rather short; a single anterior frontal, two posterior; two very small nasals; loreal none, united with the frontal; one anterior ocular, sometimes united with frontal, two postoculars; six (five) labials. Scales smooth, in fifteen or seventeen series, those near the vent sometimes keeled or tubercular; anal and subcaudals entire. Teeth equal.

The snakes of this genus are peculiar to Ceylon, and may be readily distinguished by their smooth scales, single anterior frontal, and entire subcaudal shields.

Three species may be distinguished:—

Scales in seventeen rows; præorbital present	<i>A. brachyorrhos</i> .
Scales in seventeen rows; præorbital none	<i>A. copii</i> .
Scales in fifteen rows	<i>A. trachyprocta</i> .

ASPIDURA BRACHYORRHOS.

Scytale brachyorrhos, *Boie, Isis*, 1827, p. 517.

Aspidura brachyorrhos, *Wagl. Syst. Amph.* p. 191.

Calamaria scytale, *Schleg. Phys. Serp.* ii. p. 42.

The postfrontal does not enter the orbit at all, and is in contact with the second and third labials; præorbital well developed, in contact with the superciliary; the lower postorbital larger than the upper; six upper labials. Two pairs of chin-shields: the anterior large, about thrice as long as broad; the posterior small, scale-like, without intermediate azygos scale; six lower labials, the four anterior of which are in contact with the anterior chin-shield. Scales in seventeen rows, all perfectly smooth. Ventral shields 148–154; subcaudals 30–32. The circumference of the body is one-fourteenth of the total length, the length of the tail one-eighth. Yellowish olive, with four indistinct darker longitudinal bands and with a vertebral series of black dots; an oblique black band on each side of the neck; belly uniform white.

Rather common; 14–15 inches long.

ASPIDURA COPII. (Plate XVIII. fig. E.)

The postfrontal forms the entire anterior margin of the orbit, and is in contact with the second, third, and fourth labials; no præorbital; postorbitals subequal in size; six upper labials. Three pairs of chin-shields, the middle being not much larger than the others; six lower labials, the three anterior in contact with the front chin-shield, the third and fourth with the middle, and the fourth with the hinder. Scales in seventeen rows, those on the side of the vent and tail keeled. Ventral shields 128; subcaudals 34. The circumference of the body is one-eleventh of the total length, the length of the tail two-elevenths. Brownish above, minutely dotted with black: a series of pairs of black spots runs along the back; there are twenty-six pairs of spots on the trunk, each spot occupying about four scales and having a reddish margin in front and behind. The first pair of these spots form a collar. A black transverse spot behind the angle of the mouth; each labial with a black margin behind. Belly white, marbled with black.

The only specimen I have seen of this species is an adult male, $16\frac{1}{2}$ inches long; we have procured it by purchase, without locality marked; it is very probable that it is a Ceylonese species, like its congeners. I have named it after Mr. E. Cope, who first showed the existence of another species of *Aspidura*.

ASPIDURA TRACHYPROCTA. (Plate XVIII. figs. F, F'.)

Aspidura trachyprocta, Cope, *Proc. Acad. Nat. Sc. Philad.* 1860, p. 75.

The postfrontal forms the upper part of the anterior margin of the orbit, and is in contact with the second and third labials, being generally separated from the fourth by a small præorbital; the lower postorbital larger than the upper; six upper labials. Two pairs of chin-shields: the anterior large, about thrice as long as broad; the posterior small, scale-like, and sometimes separated by another small, intermediate shield; six (five) lower labials, the four anterior of which are in contact with the anterior chin-shield. Scales in fifteen rows; those on the side of the vent are provided with a small, slightly curved spine in the male, whilst in the female they are merely keeled or entirely smooth. Ventral shields 128-144; subcaudals 10-16 in females, 21-23 in males. The circumference of the body is one-ninth or one-eleventh of the total length; the length of the tail one-twelfth or one-seventeenth in females, and one-ninth in males. Sometimes uniform brown above; sometimes with four or five series of small dark spots, which in other specimens are confluent into streaks. The middle streak runs along the vertebral line, and is more frequently present than absent; the outer streak occupies the joining edges of the second and third outer series of scales. A dark band along the side of the tail is always distinct. Belly more or less marbled with black.

This species is nearly as common in Ceylon as *A. brachyrrhos*, and attains to a length of 15 inches.

The figures referred to by F are taken from a male, those by F' from a female.

HAPLOCERCUS, *Gthr.*

Body very slender; head narrow, not distinct from neck; eye of moderate size, with round pupil; tail rather short, tapering; a single anterior frontal, two posterior; two very small nasals; loreal none, united with the frontal; one anterior ocular, two posterior; seven upper labials. Scales keeled, lanceolate, in seventeen series; anal and subcaudals entire. Teeth equal.

Ceylon.

HAPLOCERCUS CEYLONENSIS. (Plate XVIII. fig. G.)

Haplocercus ceylonensis, Günth. *Cat. Snakes*, 1858, p. 15.
Aspidura carinata, Jan, *Arch. Zool. Anat.* ii. 1862, p. 30*.

Body very slender, its circumference being one twenty-seventh of the total length; the length of the tail is one-eighth of the total. Rostral shield small, just reaching to the upper surface of the head; anterior frontal truncated in front and pointed behind, smaller than one posterior frontal. Vertical rather elongate, five-sided; one præocular, not extending on to the upper surface of the head, but in contact with the superciliary; two postoculars, the upper of which is rather larger than the lower. Nostril between two small nasals, and resting on the first labial; seven upper labials, the fourth being below the eye, and the third entering the orbit with its posterior angle; temporal shields 1 + 2, the anterior and the upper rather large, elongate. The first pair of lower labials form a suture together behind the mental. Two pairs of chin-shields, the front pair being the larger. Ventrals 208; subcaudals 45-49. Above uniform blackish, or light brown, with a narrow black vertebral line, and with two dorsal rows of small black spots; an oblique whitish, black-edged band on each side of the neck. Lower parts dull yellowish, immaculate.

Length 10 inches.

* This second name has been given by M. Jan, although he was well aware that the snake had been named and described by myself; but this, unfortunately, is only one out of several instances in which he has followed the same dishonest practice.

FAMILY OF OLIGODONTES—*OLIGODONTIDÆ*.

Body cylindrical or slightly compressed, rather rigid, with a short, sub-conical head, which is not distinct from neck; tail of moderate length, tapering. Body and tail covered with rounded, smooth scales, in fifteen, seventeen, nineteen, or twenty-one series. Belly rounded or slightly angulated; subcaudals two-rowed. Cleft of the mouth rather short; nostril lateral; eye of moderate size, with round pupil. Shields of the head normal (except in *Oligodon brevicauda*): rostral more or less enlarged, flat in front, but more or less produced far backwards. Maxillary teeth few in number, the last being the longest, not grooved. Head nearly always with symmetrical arrow-shaped markings.

Small snakes, peculiar to the East Indies.

Palatine teeth none *Oligodon*, p. 205.
 Palatine teeth present *Simotes*, p. 212.

OLIGODON, *Boie*.

Rostral shield more or less enlarged, or produced backwards; two pairs of frontals, in one species confluent into a single pair; nostril between two partly confluent nasals; one præocular, one or two postoculars. Scales smooth, in fifteen or seventeen rows. Teeth in the maxillaries few in number, the last larger than the others; no teeth on the palate.

The snakes of this genus are small, and confined to the peninsula of Southern India, Ceylon, and a few of the larger islands of the western part of the East Indian archipelago. Their "physiognomy" is so peculiar that they may be distinguished at once, and can be confounded only with species of *Simotes*. The head is short, scarcely depressed; the snout very short, covered in front with a rostral, which is always well developed, and sometimes produced far backwards between the anterior frontals; these latter shields, shortened in their longitudinal diameter and lengthened transversely, are always much smaller than the posterior. The loreal is generally present,—in a few species absent, and then confluent with the posterior frontal; only once have I observed its absence in a species which, normally,

has it distinct. The anal is bifid; in a specimen of *O. epilonotus* and in one of *O. modestus* it was entire. Further, the coloration of the head is peculiar: a brown band crosses the forehead between the front angles of the orbits, and descends obliquely on each side through the eye towards the lip, forming a distinct brown spot below the orbit; a second angular band on the crown of the head, touching with its point the hind part of the occipitals, and descending obliquely backwards behind the angles of the mouth; a third band or blotch on the neck; these transverse bands are sometimes united by a median longitudinal line or band, sometimes they are broken up in the middle into lateral portions, sometimes only traces of them remain.

Very little is known of the habits of these snakes. Their dentition is strong enough to enable them to seize other small snakes or lizards.

The following species occur in British India†:—

- * *Belly white, immaculate; seven upper labials.*
 - Back with numerous, narrow, rather irregular black cross streaks; ventral shields 180-202 *O. su grisens*, p. 207.
 - Back with about seventeen large 8-shaped brown spots; ventrals 155-162 *O. epilonotus*, p. 207.
 - Back with about thirty-seven large rhombic black spots; ventrals 156 *O. ellioti*, p. 207.
 - ** *Eight or nine upper labials.*
 - Belly white, with a series of black dots on each side *O. subpunctatus*, p. 208.
 - Belly uniform white *O. spinipunctatus*, p. 208.
 - *** *Belly with numerous small brown spots, irregularly disposed.*
 - Back with about twenty-seven cross bands *O. fasciatus*, p. 208.
 - **** *Belly with three series of brown dots.*
 - Back with pairs of transverse spots *O. sublineatus*, p. 209.
 - ***** *Belly with quadrangular black spots.*
 - Scales in seventeen rows; the sixth labial shield enters the labial margin *O. affinis*, p. 209.
 - Scales in fifteen rows; the sixth labial shield does not enter the labial margin *O. templetonii*, p. 209.
 - Loreal none, one postocular *O. modestus*, p. 210.
 - A yellow band runs along the whole vertebral line; two pairs of frontals *O. dorsalis*, p. 210.
 - A single pair of frontals *O. brevicauda*, p. 211.
- (Appendix: *O. dorsalis*, Berthold, p. 211.)

† In the list of Reptiles and Fishes observed by Mr. Hodgson in Nepal, I have mentioned *Simotes octolineatus* (Proc. Zool. Soc. 1861, p. 216), referring two coloured drawings presented to the British Museum by that gentleman, to the variety with two series of spots on the belly. I am now convinced that those drawings represent an unknown species.

OLIGODON SUBGRISEUS. (Plate XIX. fig. F.)

Oligodon subgriseum, *Dum. & Bibr.* vii. p. 59.

Scales in fifteen rows. Loreal distinct (exceptionally confluent with posterior frontal); one præocular, two postoculars; seven upper labials, the third and fourth entering the orbit; temporals 1+2. Ventral shields 180(-187-189)-202; subcaudals 48-54. Head with symmetrical brown, black-edged markings; back with numerous, narrow, rather irregular, reticulated cross streaks, formed by the black edges of some of the scales, and interrupted by three more or less distinct, narrow whitish lines, one of which runs along the vertebral line. Belly uniform white: some specimens have a minute black dot on the lateral edge of every second or third abdominal shield.

This species inhabits the southern parts of the peninsula of India; Capt. R. H. Beddome found it in the Anamallay Mountains; our largest specimen is 19 inches long.

Figure F on Plate XIX. shows the coloration of the back.

OLIGODON SPILONOTUS. (Plate XIX. figs. E, E'.)

Scales in fifteen rows. Loreal distinct; one præocular, two postoculars; seven upper labials, the third and fourth entering the orbit; temporals 1+2. Ventral shields 155-162; subcaudals 50*. Head with symmetrical brown, black-edged markings: an angular band across the forehead, descending obliquely through the eye; a second on the crown, descending to the angle of the mouth, separated from the nuchal band by a yellowish interspace; nuchal band nearly as large as the head, and covering the extremity of the occipitals. Back with about seventeen large 8-shaped brown, black-edged transverse spots; they are distant from one another, the middle of each interspace between them being occupied by a narrow transverse stripe formed by the black edges of some of the scales; the transverse bands and stripes become gradually similar to one another on the hinder part of the body. Lower parts uniform white.

We have received this species from the Madras Presidency. The largest of three specimens is 15 inches long; we have given two views of its head (E), and one of a portion of its body (E'), to show its coloration.

OLIGODON ELLIOTTI. (Plate XIX. fig. G.)

Scales in fifteen rows. Loreal distinct; one præocular, two postoculars; seven upper labials, the third and fourth entering the orbit; temporals 1+2. Ventral shields 156; subcaudals 30. Head with symmetrical brown markings: an angular band across the forehead, descending obliquely through the eye; a second on the crown, descending to the angle

* The anal shield is bifid in two specimens and entire in another.

of the mouth, where it becomes broader and confluent with a large nuchal spot; a faint continuation of this band runs round the throat. Back of the trunk with about thirty-seven large rhombic black spots of equal size, each of which transmits a process downwards on each side, the process being separated from the central spot by a few white scales. The lower parts entirely white.

A single specimen, $10\frac{1}{2}$ inches long, was sent from Madras by Walter Elliott, Esq. Figure G shows the coloration of the back.

OLIGODON SUBPUNCTATUS.

Oligodon subpunctatum, *Dum. & Bibr.* vii. p. 58.

Loreal distinct; eight upper labial shields, the fourth, fifth, and sixth of which enter the orbit; temporals 2+2. Head with the usual symmetrical markings. Body greyish, with a dorsal series of round black spots edged with white; belly whitish, each ventral shield with a black dot on each side, the dots forming regular longitudinal series.

Coast of Malabar.

OLIGODON SPINIPUNCTATUS.

Oligodon spinipunctatus, *Jan, Arch. Zool. Anat.* ii. p. 40.

Scales in seventeen rows. Loreal distinct; one præocular and two postoculars; nine upper labials, the fourth, fifth, and sixth of which enter the orbit; temporals 2+2. Ventral shields 193; subcaudals 62. Resembles *O. subpunctatus* in coloration, but has no spots on the belly.

The typical specimen is stated to be from Calcutta; but this, of course, is incorrect, as the genus *Oligodon* does not extend so far eastwards.

OLIGODON FASCIATUS. (Plate XIX. figs. D, D'.)

Scales in fifteen rows. Loreal distinct; one præocular, two postoculars; seven upper labials, the third and fourth entering the orbit; temporals 1+2. Ventral shields 180; subcaudals 40. Symmetrical markings on the head very indistinct: the second angular band on the head is not confluent with the nuchal spot on the sides. Body brownish olive: trunk with about twenty-seven broadish, brown, black-edged cross bands, each slightly interrupted by a narrow yellow vertebral line; the cross bands are subequal in size, rather irregular in shape, each being apparently composed of four spots; they are nearly as broad as the interspaces between them. Belly whitish, with small brown spots, more numerous on the sides than in the middle.

Two specimens were collected in the Deccan by Colonel Sykes. Total length 14 inches, of which the tail takes 2 inches.

We have given figures of portions of the trunk and of the belly (D'), to show their coloration, and a lateral view of the head (D).

OLIGODON SUBLINEATUS.

Oligodon sublineatus, *Dum. & Bibr.* vii. p. 59.

Scales in fifteen rows. Loreal distinct; one præocular, two postoculars; seven upper labials, the third and fourth entering the orbit; temporals 1+2. Ventral shields 150; subcaudals 32. Brownish olive: a brown spot below the eye; a large brown blotch on each side of the neck; back with pairs of rather small, transverse, brown, light-edged spots, those of one side not exactly corresponding to those of the other. Each ventral shield with three brown dots, the dots forming three punctated streaks; tail with two similar series below.

A small species (10 inches long), common in and peculiar to Ceylon.

OLIGODON AFFINIS. (Plate XIX. figs. B, B'.)

Oligodon affinis, *Günth. Ann. & Mag. Nat. Hist.* Jan. 1862, p. 58.

Scales in seventeen rows. Loreal none, confluent with posterior frontal; one præocular, two postoculars; seven upper labials, the third and fourth entering the orbit; temporals 1+2. Ventral shields 134; subcaudals 25. The two angular bands on the head (usually found in the species of this genus) and the nuchal band are joined by a broad median longitudinal streak; nuchal band very narrow, crescent-shaped. Body brownish grey; back crossed by about thirty-eight short black streaks not broader than half a scale. Belly white, with subquadranal black spots, both colours being distributed in nearly equal proportions.

This very fine species was discovered by Captain R. H. Beddome in the Anamallay Hills; a specimen measures $10\frac{1}{2}$ inches, of which the tail takes $1\frac{1}{2}$ inch. We have given figures of a part of the body and of the belly (B'), to show their coloration, and a side view of the head (B).

OLIGODON TEMPLETONII. (Plate XIX. fig. C.)

Oligodon templetonii, *Günth. Ann. & Mag. Nat. Hist.* Jan. 1862, p. 57.

Scales in fifteen rows. Loreal distinct; one præocular, two postoculars; seven upper

labials, the third and fourth entering the orbit; the fifth and seventh are in contact with each other below, excluding the sixth from the labial margin. Temporals 1+2. Ventral shields 135; subcaudals 31. Head with an indistinct dark band between the eyes, descending through the orbit; a brown blotch on each side of the neck. Body brownish, with a light vertebral band, which becomes more distinct on the tail, and is crossed by about eighteen narrow, short, dark-brown bands. Belly white, with square black spots, both colours being distributed in nearly equal proportion.

We have received only one specimen of this species, through Dr. R. Templeton, who sent it from Ceylon; it is $10\frac{1}{2}$ inches long, the tail measuring $1\frac{1}{2}$ inch. We have given a lateral view of the head, for comparison with *O. affinis*.

OLIGODON MODESTUS.

Scales in fifteen rows. Loreal none, confluent with posterior frontal; one præ- and one postocular; six upper labials, the third being the largest, forming the entire lower margin of the orbit; temporals 1+2. Ventral shields 158; (anal entire;) subcaudals 41. The markings on the upper parts of the head are very obscure; the dark-coloured occiput and neck are separated by a lighter collar; brown spot below the eye very distinct. Body uniform greyish brown; a yellowish vertebral band becomes distinct on the hinder part of the trunk and on the tail. Belly white, with quadrangular black spots, the ground-colour rather predominating.

The single specimen in the British Museum was purchased of Mr. Cuming, who stated that it came from the Philippine Islands. We have reason to doubt this, and to suppose that it was one of a number of Ceylonese reptiles received at the same time. It is an adult male, 13 inches long, the tail measuring 2 inches.

OLIGODON DORSALIS.

Elaps dorsalis, Gray, *Ind. Zool.* c. fig.

Oligodon dorsalis, Günth. *Colubr. Snakes*, p. 22.

Scales in fifteen rows. Loreal distinct; one præ- and one postocular; seven upper labials, the third and fourth of which enter the orbit; temporals 1+2. Body slender; ventral shields 173-175; anal bifid; subcaudals 50. Head brown, symmetrically marbled with darker; a dark-brown spot below the eye; rostral shield dark brown with a yellow edge; nuchal spot small. Body brownish grey, minutely punctulated with black*: a yellow band, two scales broad, extends from the neck to the tip of the tail; it is bordered on each side with a series of small black spots, and interrupted by two or three large black spots on the

* The typical specimen is reddish white, but evidently bleached.

back of the tail; a narrow black band runs along each side of the trunk. Belly white, with quadrangular black spots, which are sometimes so numerous and so frequently confluent as nearly entirely to suppress the ground-colour. The middle of the lower surface of the tail always remains white.

Inhabits, probably, Afghanistan, a second specimen having been found in Griffith's collection. It is a male, like the typical specimen. Total length 16 inches; tail 3 inches.

OLIGODON BREVICAUDA. (Plate XIX. fig. A.)

Oligodon brevicauda, Günth. *Ann. & Mag. Nat. Hist.* Jan. 1862, p. 58.

Rostral shield rather thick, broad, reaching far backwards on the upper side of the head. Only one pair of frontals. Loreal none, the nasal being in contact with the single præocular; two postoculars; seven upper labials, the third and fourth entering the orbit; temporals 1+2. Scales in fifteen rows. Ventral shields 172; anal bifid; subcaudals 30. Head with the symmetrical markings usual in this genus, viz. a brown fronto-labial band; the band on the crown of the head is rather broken up, and its lateral portions are confluent with the large nuchal band. Body greyish violet: a band runs along the vertebral line; it is indistinct anteriorly, light greyish on the middle of the body, and becomes pure white posteriorly and on the tail; it is bordered anteriorly by a series of pairs of small equidistant blackish spots; there are no black spots on the tail interrupting the dorsal band. A blackish longitudinal streak on each side, along the third outer series of scales. Ground-colour of the belly the same as of the upper parts, with black quadrangular spots; subcaudals whitish.

This species also was discovered by Captain R. H. Beddome in the Anamallay Mountains. One might be inclined to consider it as the type of a distinct genus; but this is forbidden by its close proximity to *O. dorsalis*. The only specimen we have seen is a female, 15 inches long, the tail measuring 1 inch and 7 lines; we have given a view of the upper side of the head, besides the entire figure.

Finally, Berthold (Gött. Nachr. 1859, p. 179) refers some snake to the genus *Oligodon*, but the characters given seem to indicate that it belongs to another genus, wherefore we do not propose an alteration of the specific name, which is preoccupied:—

"*OLIGODON DORSALE*.—Supra cinereum, linea mediana alba, vitta interoculari brunnea flexa; infra album; squamis 13. Ventr. 183; an. 1; caud. 46.—Bengal."

SIMOTES, Dum. & Bibr.

Rostral shield more or less enlarged, truncated, bent and produced backwards; anterior frontals narrow, transverse; nostril between two nasals. Scales smooth, in seventeen, nineteen, or twenty-one rows. Teeth in the maxillaries few in number, the last longer than the others; palatine teeth.

The *Simotes* are Oligodontes of a larger size and with palatine teeth; the number of the rows of scales is somewhat enlarged in *Simotes*, which, otherwise, has the same physiognomy as *Oligodon*. In both we find the peculiar markings of the head which we have described in the latter genus; traces at least of those markings are always visible. These snakes are of rather fierce habits, but perfectly harmless; their geographical distribution is not so limited as that of *Oligodon*, as they extend all over the continent and over many of the islands. The following are found on the continent:—

* Scales in seventeen rows.

† Anal bifid; belly with quadrangular black spots.

 Loreal none *S. venustus*, p. 213.

†† Anal bifid; belly uniform white.

 Black, white-edged bands across the back *S. russellii*, p. 213.

 Angular, light-coloured, black-edged bands across the back *S. binotatus*, p. 214.

 Uniform brownish above *S. albiventer*, p. 214.

††† Anal entire.

 White bands across the back *S. signatus*, p. 215.

 Uniform brownish grey above; the anterior chin-shield is in contact with four labials; belly immaculate, white *S. cinereus*, p. 215.

 Indistinct reticulated bands across the back; the anterior chin-shield is in contact with three labials; belly immaculate, white *S. swinhonis*, p. 215.

 Eight upper labial shields; body with dark longitudinal bands;

 belly with quadrangular black spots *S. tenuatus*, p. 216.

 Body with three whitish longitudinal bands *S. trilineatus*, p. 216.

** Scales in nineteen rows.

Seven upper labial shields; two preorbitals, equal in size or confluent

into one *S. punctulatus*, p. 217.
(*S. labuanensis*, p. 217.)

Seven (eight) upper labial shields; two preorbitals, the upper being

the larger; belly with two regular series of brown spots *S. bicatenatus*, p. 217.

Eight upper labial shields; two (three) preorbitals, the upper being

the larger; white, dark-edged bands across the back *S. albocinctus*, p. 218.

*** Scales in twenty-one rows.

Belly white; numerous reticulated streaks and bands across the back;

ventrals 163 *S. fasciolatus*, p. 218.

Belly white; twelve black bands across the back; ventrals 216 *S. cochinchinensis*, p. 219.

Belly with quadrangular brown spots; a triple series of spots along

the trunk; ventrals 183-189 *S. trinotatus*, p. 219.

SIMOTES VENUSTUS.

Xenodon venustum, *Jerdon, Journ. As. Soc. Beng.* xxii. p. 528.

Scales in seventeen rows. Loreal none, confluent with posterior frontal, the lower angle of which is in contact with the second labial; one præocular, two postoculars; seven upper labials, the third and fourth entering the orbit; the sixth is excluded from the labial margin, the fifth and seventh being contiguous below; temporals 1+2. Anterior chin-shields not twice as long as broad, in contact with four labials; posterior chin-shields half as large as anterior. Ventral shields 142-145; anal bifid; subcaudals 31-35. Ground-colour greyish or reddish brown, with three series of rounded black, yellow-edged spots: each spot of the vertebral series is 8-shaped, evidently composed of two smaller ones; the spots of the lateral series are more oblong and rather irregular, sometimes touching the median spots; head with the usual symmetrical markings. Belly white, with quadrangular black spots, both colours being distributed in equal proportions.

This species is rare on the west coast of the peninsula of India; it attains to the length of 16 inches, the tail measuring $2\frac{1}{2}$ inches.

It would have been impossible to identify this species from the characters of *Xenodon venustum* given by Mr. Jerdon but for a *named* drawing in the possession of Walter Elliott, Esq.

SIMOTES RUSSELLII.

Russell, Ind. Serp. i. tab. 35 & 38.

Coluber arnensis, *Shaw, Gen. Zool.* iii. p. 526.

— *russellii*, *Daud. Rept.* vi. p. 395.

— *monticolus* (*Hodgson*), *Cantor, Proc. Zool. Soc.* 1839, p. 51.

Coronella russellii, *Schleg. Phys. Serp.* ii. p. 78.

Simotes russellii, *Dum. & Bibr.* vii. p. 628.

Scales in seventeen rows; occipitals subtruncated behind; loreal distinct, sometimes confluent with posterior frontal; one præorbital, two postorbitals; seven upper labials, the third and fourth of which form the lower part of the orbit; temporals 1+2. Anterior chin-shields twice as large as posterior. Ventral shields 160-190; anal bifid; subcaudals 47-56. Ventral shields with a slight keel. Brownish olive, with the bands on the head very distinct; body with well-defined black, white-edged cross bands; belly uniform white.

Var. *a*. Cross bands as broad as a scale long, about thirty on the trunk. Anamallay Mountains, Madras, Nepal, Sikkim.

Var. *β*. Cross bands of the width of three scales, about twenty-three on the trunk. Anamallay Mountains.

Var. *γ*. Cross bands broadest in the middle, nearly as broad as the interspaces between them; about twenty-five on the trunk. Dukhun.

Var. *δ*. Cross bands of the width of three scales, about seventeen on the trunk. Ceylon.

This species is rather common in the peninsula of India, extending northwards into Nepal and the Himalayas, where it reaches an altitude of 4100 feet above the level of the sea; it occurs also in Ceylon, but it does not appear to be common there. The largest specimen I have seen is 25 inches long, the tail measuring 5 inches.

SIMOTES BINOTATUS.

Xenodon dubium, Jerdon, *Journ. As. Soc. Beng.* 1853, p. 528.

Simotes binotatus, Dum. & Bibr. vii. p. 630.

Scales in seventeen rows; loreal distinct; one præorbital, two postorbitals; seven upper labials, the third and fourth of which form the lower part of the orbit. Ventral shields 181; subcaudals 41. Head with three angular white, black-edged cross bands: the first crosses the snout, descends to the lip, and passing the eye it is united with the second band; the third occupies the neck and occiput, its light portion being heart-shaped. Back with a series of pairs of square, brownish-grey, black-edged spots which are confluent at their internal angles, forming Σ -shaped cross bands; other smaller spots form a lateral series, and correspond either to the cross bands described, or to the interspaces between them. Lower parts uniform white.

Coast of Malabar; North Canara.

Mr. Walter Elliott has lent me a coloured drawing of *Xenodon dubium*, Jerd., from which I see that it is identical with *Simotes binotatus*, Dum. & Bibr., although Jerdon states that his snake has only fifteen series of scales. Jerdon's denomination would be prior to that given by Duméril, but no right of priority can be established on the ground of so insufficient a diagnosis as that given for "*Xenodon dubium*, n. s.!"

SIMOTES ALBIVENTER. (Plate XX. fig. D.)

Simotes purpurascens, var. A, Günth. *Colubr. Snakes*, p. 25.

Scales in seventeen rows. Occipital obliquely truncated behind; loreal none, confluent with the posterior frontal; one præ-, two postorbitals; seven upper labials, the third and fourth forming the lower part of the orbit; temporals 1+2. Anterior chin-shields not twice as long as broad, in contact with three labials; posterior chin-shields half as large as anterior. Ventrals 179; anal bifid; subcaudals 45; ventrals without lateral keel. Uniform greyish brown above, whitish below; a dark spot below the eye.

Ceylon. Total length 24 inches; tail $3\frac{1}{2}$ inches. We have given a lateral view of the head, of the natural size.

SIMOTES SIGNATUS. (Plate XX. figs. F, F.)

Simotes purpurascens, var. F, *Günth. Colubr. Snakes*, p. 26.

Scales in seventeen rows. Occipitals rounded behind. Loreal distinct; one præ- and one postorbital; seven upper labials, the third and fourth forming the lower part of the orbit; temporals 1+2. Anterior chin-shields not much longer than broad, in contact with three labials; posterior chin-shields scale-like. Ventrals 149-157; anal entire; subcaudals 59-47. Ventrals without keel. Brown, with reddish-white cross bands edged with darker. Belly whitish, with a few small brown lateral spots anteriorly.

Var. α . Specimen 21 inches long; tail 5 inches. Fifteen cross bands on the trunk, broadest in the middle, tapering on the sides; their widest part covers three to four transverse series of scales, and is one-fourth of the interspace between the bands; a whitish transverse line crosses the middle of each interspace.

Var. β . Specimen 15 inches long; tail 3 inches. Fourteen whitish escutcheon-like spots along the back, the point of which is directed forwards, emitting on each side a whitish streak descending obliquely backwards; each spot is longer than broad, half as long as the interspace between two spots; an indistinct oblique whitish line in the middle of each interspace.

The two specimens are said to be from Singapore; but whether this is their real native place, or they have been merely procured there, is uncertain.

We have given an entire figure of the specimen of var. β (F), with two views of its head (F').

SIMOTES CINEREUS.

Scales in seventeen rows. Occipitals truncated behind; loreal distinct; a large præorbital, below which there is sometimes a second very small one; two postorbitals; eight upper labials, the fourth and fifth forming the lower part of the orbit; temporals 1+2. Anterior chin-shields twice as long as broad, in contact with four labials; posterior chin-shields scale-like. Ventrals 165, with an obtuse keel along each side; anal entire; (tail injured). Uniform brownish grey above, white below; a very indistinct spot below the eye.

We have received only one example, from Gamboja; it is 17 inches long without the tail, which is broken off.

SIMOTES SWINHONIS. (Plate XX. fig. F.)

Scales in seventeen rows. Occipitals truncated behind; loreal distinct; two præorbitals, the lower of which is smaller than the upper; two postorbitals; eight (seven) upper labials, the fourth and fifth forming the lower part of the orbit; the second and third or the seventh and eighth are sometimes united into one shield; temporals 1+2. Anterior chin-shields

twice as long as broad, in contact with three labials; posterior chin-shields one-third the size of the anterior. Ventrals 158-168; anal entire; subcaudals 35-39. Ventral shields with a very obtuse keel along each side. Reddish olive above, with numerous indistinct reticulated cross bands, produced by the blackish edges of some of the scales. Head with scarcely any trace of markings. Lower parts pure white.

I have seen three specimens of this species, one of which was brought by Mr. Swinhoe from Amoy. It is 16 inches long, the tail measuring $2\frac{1}{2}$ inches; we have given a figure of a portion of its back, to show the coloration, and a side view of the head.

SIMOTES TÆNIATUS. (Plate XX. fig. A.)

Simotes tæniatus, Günth. *Proc. Zool. Soc.* 1861, p. 189.

Scales in seventeen rows*. Occipitals obliquely truncated behind; loreal distinct; two præorbitals, the lower of which is much smaller than the upper; two postorbitals; eight upper labials, the fourth and fifth of which form the lower part of the orbit; the lower præorbital is sometimes confluent with the third labial, so that three labial shields enter the orbit; temporals $1+1+2$. The anterior chin-shields are not twice as long as broad, in contact with four labials; the posterior are rather shorter than the anterior. Ventral shields 150-166; anal entire; subcaudals 42-44 in the male, and 30-35 in the female. Head with the symmetrical markings usual in this genus distinct. Body brownish olive, with a brown dorsal band enclosing a light vertebral line. A brown line runs along each side of the body, along the joining edges of the third and fourth outer series of scales; sometimes it is only represented by a series of dark dots. Belly white, with quadrangular black spots, more numerous in the female than in the male. Two large blackish spots on the back of the tail—one at its root, the other near its extremity.

This species inhabits Gamboja and the neighbourhood of Bangkok, and attains to the length of 15 inches, the tail measuring 2 inches.

SIMOTES TRILINEATUS.

Simotes trilineatus, *Dun. & Bibr.* vii. p. 636.

Scales in seventeen rows. Loreal distinct; one præ- and one postorbital; seven upper labials, the third and fourth of which enter the orbit. Ventral shields 145; anal entire; subcaudals 54. Body reddish brown above and below, with three longitudinal bands: one runs along the vertebral line and is yellowish; the others are white, bordering the sides of the belly.

This species is from the Indian continent, but from what part is not known.

* The former statement that the scales are in nineteen rows, is erroneous.

SIMOTES PUNCTULATUS.

? *Coronella violacea*, Cantor, *Proc. Zool. Soc.* 1839, p. 50*.

Coronella punctulatus, Gray, *Ann. & Mag. Nat. Hist.* 1853, xii. p. 389.

Simotes purpurascens, var. D & E, Günth. *Cat. Snakes*, p. 25.

Scales in nineteen rows. Occipitals obliquely truncated behind; loreal distinct; two pre-orbitals, equal in size, frequently confluent into one; two postorbitals; seven upper labials, the third and fourth forming the lower part of the orbit; the second labial is sometimes split into two; temporals 1+2. Ventral shields 180-202; anal entire; subcaudals 52-62. Ventral shields with an obtuse keel along each side. Belly with more or less confluent square black spots.

Var. α . Brown: back crossed by about twenty-three straight, light-brown, black-edged bands, each about two scales broad. Khasya.

Var. β . Brown: back with about twenty-two pairs of roundish, lighter, black-edged spots; the spots of each pair are separate in young specimens, but more or less confluent in old ones, forming 8-shaped figures. Khasya, Nepal.

Var. γ . Brown: back with very numerous irregular transverse lines formed by black edges of some of the scales (as in *Oligodon subgriseus*). Khasya.

Var. δ . Nearly uniform blackish brown. Sikkim.

This snake is a mountain species, and is found in different parts of the Himalayas, where it ascends into the temperate zone to above 4000 feet above the level of the sea. Although living at a higher altitude than most of its congeners, it attains to the large size of from $2\frac{1}{2}$ to 3 feet.

Note.—A species from Labuan is very similar to *S. punctulatus*, but is distinguished by a greater number of temporals, viz. 2+3. Ventrals 172-187; subcaudals 60. We propose for it the name *Simotes labuanensis*. It is figured in Motley and Dillwyn's 'Contributions to the Natural History of Labuan,' p. 49, under the name of *Calamaria brachyrrhos*. Our specimen has the lower preorbital much smaller than the upper, whilst in the figure quoted both are of equal size; we may also remark that the tail of the specimen figured had evidently been injured.

SIMOTES BICATENATUS.

Scales in nineteen rows. Occipitals obliquely truncated behind; loreal distinct; two pre-orbitals, the lower of which is much smaller than the upper; seven upper labials, the third and fourth of which enter the orbit; the second labial may be divided into two; temporals

* The typical specimen of *Coronella violacea* appears to be lost; however, there is a coloured drawing of it, with a more detailed description written by Cantor himself, in the collection of the Oxford Museum. He had seen only one example, and there cannot be any doubt that it was a *Simotes*, which probably belonged to our variety δ . of *S. punctulatus*.

1+2. Ventral shields 170; anal entire; subcaudals 43. Ventral shields distinctly keeled on the sides. Light brownish, with three rather indistinct dark longitudinal bands—one along the back, and the lateral along the third and fourth outer series of scales; these bands disappear entirely when the epidermis is lost. Head with the markings usual in this genus. Belly yellowish, each ventral shield with a brown spot near the lateral edge, the spots forming two chain-like series; subcaudals nearly uniform yellowish.

One example of this species is $21\frac{1}{2}$ inches long, the tail measuring $3\frac{1}{2}$ inches. It was in a collection containing only species from British India, hence it is probable that it is a native of the continent of India.

Cantor, in his list of Indian Snakes (Proc. Zool. Soc. 1839, p. 51), mentions a *Coronella cyclura*, the typical specimen of which, unfortunately, appears to be lost. A coloured drawing of it, with a short description, are in the possession of the Oxford Museum; and from their examination it did not appear to me to be impossible that they have been taken from a specimen of *S. bicatenatus*. However, the drawing does not represent a snake with the physiognomy of a *Simotes*, the coloration of the upper parts is different, and *C. cyclura* would appear to have only one præocular. Under these circumstances, I have preferred to describe our specimen under a distinct name.

SIMOTES ALBOCINCTUS.

Coronella albocincta, Cantor, Proc. Zool. Soc. 1839, p. 50.

Simotes albocinctus, Dum. & Bibr. vii. p. 633. pl. 82. fig. 1.

Scales in nineteen rows. Loreal distinct; two (or three) præorbitals, the upper much larger than the others; two postorbitals; eight upper labials, the (fourth and) fifth of which enter the orbit. Ventrals 175–181; anal entire; subcaudals 47–65. Brownish, with about eighteen white, dark-edged cross bands; a pair of fine black transverse lines in the middle of each interspace between these cross bands. Head with the usual cross bands, which are whitish and edged with darker. The ventral shields are alternately uniform white or marked with quadrangular brown spots.

Assam (Chirra-Punji).

SIMOTES FASCIOLATUS. (Plate XX. fig. B.)

Simotes trinitatus, var., Günth., Proc. Zool. Soc. 1860, p. 114.

Scales in twenty-one rows. Occipitals obliquely truncated behind; loreal distinct; two præorbitals, the lower of which is much smaller than the upper; two postorbitals; eight upper labials, the fourth and fifth of which form the lower part of the orbit; temporals 2+2+3. Anterior chin-shields not quite twice as long as broad, in contact with four lower

labials; posterior chin-shields small, scale-like. Ventral shields 163-164; anal entire; subcaudals 42-45. Ventral shields slightly bent upwards on the side of the body. Yellowish olive above: fronto-labial band distinct; the oblique band on the side of the occiput does not meet its fellow on the crown of the head, but is confluent with a broad angular nuchal band. Numerous scales on the back are edged with black, the black edges producing numerous irregular narrow transverse lines and less numerous broader cross bars, the latter about fourteen in number. A broad lighter band runs along each side of the back; tail with a median whitish longitudinal band. Lower parts pure white.

We have received two specimens from Pachebone, through M. Mouhot; they are 19 inches long, the tail measuring 3 inches. Two views of the head are given on Plate XX., of the natural size.

SIMOTES COCHINCHINENSIS. (Plate XX. fig. C.)

Scales in twenty-one rows. Occipitals rounded behind; loreal distinct; two præorbitals, the lower of which is much smaller than the upper; two postorbitals; eight upper labials, the fourth and fifth of which form the lower part of the orbit; temporals 2+2. Anterior chin-shields nearly twice as long as broad, in contact with four lower labials; posterior chin-shields small, scale-like. Ventral shields 216; anal entire; subcaudals 47. Ventral shields with an obtuse keel on each side. Greyish olive, with twelve black cross bands on the trunk, and three on the tail; each of these bands is two scales broad, and formed by two square spots on the back and by a smaller spot on each side; these spots are confluent. Markings of the head deep black; the nuchal blotch emits a process forwards, extending to the vertical and separating the oblique bands which descend behind each angle of the mouth. Lower parts pure white.

We have seen only one young specimen of this species, which was found by M. Mouhot in the Lao Mountains; it is 7 inches long, the tail measuring 1 inch.

SIMOTES TRINOTATUS.

Simotes trinotatus, *Dum. & Bibr.* vii. p. 631.

Xenodon purpurascens, *Cantor, Mal. Rept.* p. 67 (not *Schleg.*).

Scales in twenty-one rows. Loreal distinct; two præ- and two (three) post-orbitals; eight upper labials, the fourth and fifth of which enter the orbit. Ventral shields 183-189, with an obtuse lateral keel; anal entire; subcaudals 49-51. Yellowish brown, with a triple series of darker, black-edged spots: the lateral spots have a curved upper black edge, the convexity of which is turned upwards, and each is united with the corresponding spot of the other side by an intermediate subhexagonal spot. The markings on the head are indistinct;

a dark spot below the eye; belly yellowish, with quadrangular brown spots, irregularly arranged and more numerous posteriorly than anteriorly.

Duméril and Bibron say that their specimen is from China. Our specimen (type of Cantor's *Xenodon purpurascens*) is from Pinang, and agrees almost entirely with Duméril's description: but it has three postoculars instead of two; the lower præocular is much smaller than the upper, which, again, is sometimes divided into two; temporals rather irregularly arranged. Our specimen is 24 inches long, the tail measuring $3\frac{1}{2}$ inches.

FAMILY OF COLUBRIDES—*COLUBRIDÆ*.

This family comprises the greater part of the non-venomous snakes, namely all those which do not present any striking character either in their general habit, in the shields of the head, in the dentition, or in any other part of their organization: we therefore describe the body as of moderate length compared with its circumference, flexible in every single part; the head as well-proportioned in every dimension, and distinct from neck; the eye of moderate size, the nostril lateral; the cleft of the mouth in accordance with the length of the head. They have numerous teeth in the jaws and on the palate, but no fangs in front or in the middle of the maxillary. The subcaudals are two-rowed; and the chin-shields symmetrically arranged, separated by a longitudinal mental groove.

These snakes are found in every part of the temperate and tropical regions, but are only scantily represented in Australia and in the islands of the Pacific. The species are so numerous and show such a gradual passage between extreme forms, that, although genera can be easily characterized, it is almost impossible to distinguish wider groups by definite characters. We have endeavoured to refer the genera to certain groups distinguished by their mode of life; but in order to determine a species it is sufficient to compare only the generic characters without reference to those given for the groups.

Synopsis of the Genera.

GROUP OF GROUND COLUBRIDES—*CORONELLINA*.

Colubride snakes of small size, with smooth scales, which generally are disposed in thirteen, fifteen, or seventeen series; some of them approach in general habit the *Calamariidæ*, whilst others have a more slender body and even angulated ventral shields. They live on the

ground, and are generally of not brilliant coloration; only a few which frequent grassy plains are of a bright green colour.

- Scales smooth, in 13-17 series, those on the back equal in size; ventrals not angulated; one loreal; two nasals; maxillary teeth equal in length . . . *Ablabes*, p. 223.
 Scales smooth, in 15 series; one nasal; maxillary teeth equal in length . . . *Cyclophis*, p. 229.
 Scales smooth, in 13-15 series; ventrals angulated; two præoculars; maxillary teeth equal in length . . . *Odontomus*, p. 233.
 Scales smooth, in 15 series; ventrals angulated; the three posterior maxillary teeth long, treuchant, not grooved . . . *Nymphophidium*, p. 235.
 Scales smooth, in 17-23 series; ventrals not angulated; two nasals; the posterior maxillary tooth longest, either in a continuous series with the others or grooved . . . *Coronella*, p. 236.

GROUP OF TRUE COLUBRIDES—*COLUBRINA*.

These snakes form, as it were, the nucleus of the whole family, or, rather, of the whole suborder of innocuous snakes; they are typical forms, not characterized by the excessive development of some particular organ, but by the fairness of the proportions of all parts. Yet some of them have a more slender body than others which always live on the ground; they are land snakes, but swim well when driven into the water, or climb when in search of food. Their scales form never less than fifteen series, generally more. Their teeth are numerous, subequal in size, except in the genus *Zamenis*. They are of moderate or rather large size.

- Scales smooth or feebly keeled, in 19-27 series; one præocular; anal bifid; maxillary teeth equal in length . . . *Coluber*, p. 237.
 Scales keeled; ventrals 200 or more in number; anal bifid; one loreal; two præoculars; maxillary teeth equal in length . . . *Elaphis*, p. 240.
 Scales keeled, in 19-23 series; ventrals more than 200 in number; anal entire (except in *C. hodgeonsii*); one præocular; maxillary teeth equal in length . . . *Comptosoma*, p. 243.
 Scales keeled or with a pair of apical grooves, in 25-27 series; ventrals more than 200 in number; anal entire; one præocular; maxillary teeth subequal in size . . . *Cynophis*, p. 246.
 Scales smooth or feebly keeled, in 15-17 series; loreals two or three . . . *Ptyas*, p. 248.
 Scales smooth, in 17 series, those of the vertebral series hexagonal . . . *Xenelaphis*, p. 250.
 The posterior maxillary tooth is lengthened, and separated from the others by a short interspace; ventral shields 200 or more in number, rounded or very indistinctly angulated . . . *Zamenis*, p. 252.

GROUP OF BUSH COLUBRIDES—*DRYADINA*.

The form of these snakes is elongate and somewhat compressed, indicating their climbing propensities; they have the body not so excessively slender as the true Tree Snakes, to which they lead off. They are much more numerous in the New World than in the Old,

and only the following genera are found in British India. Green is very frequently the ground-colour in this group.

Scales in 14 or 16 series *Zaocys*, p. 255.

The last maxillary tooth is the longest, in a continuous series with the others.

Ventrals more than 200 in number, angulated *Herpetoreas*, p. 257.

GROUP OF FRESHWATER COLUBRIDES—*NATRICINA*.

These snakes are generally not elongate or compressed, and the number of their ventral shields is considerably less than 200. All the Indian forms have keeled scales. They freely enter the water in pursuit of their food, which consists chiefly of frogs and fishes. All the snakes of the preceding groups overpower their prey by throwing some coils of the body round or over it, and commence to swallow it only after it has been smothered or at least exhausted; but the Natricines swallow their prey immediately after they have seized it. The genus *Tropidophis* leads off to the true Freshwater Snakes or *Homalopsides*, the Indian species of which are distinguished by their grooved posterior tooth.

Scales keeled; ventrals considerably less than 200 in number, rounded; two anterior frontals; maxillary teeth lengthened behind *Tropidonotus*, p. 258.

Scales keeled; ventrals considerably less than 200 in number, rounded; only one anterior frontal *Atretium*, p. 272.

Scales keeled, in 19 rows; ventrals considerably less than 200 in number, rounded; maxillary teeth widely set, the middle a little longer than the others *Xenochrophis*, p. 273.

Scales keeled, in 19 rows; ventrals considerably less than 200 in number, rounded; maxillary teeth smallest behind, gradually becoming longer anteriorly *Prymnomicodon*, p. 274.

Appendix.

Among the drawings sent by Mr. Hodgson from Nepal, is one of a snake, 10½ inches long, to which he gave the name of *Coluber sanguiventer*. Cantor, who examined this drawing (which is now in the British Museum), introduced the snake into his list of Indian Serpents, with the name of *Hurriah sanguiventer* (Proc. Zool. Soc. 1839, p. 52). The drawing as well as the diagnosis are too imperfect to show what place in the system should be assigned to this snake; but, from the characters known, it would appear that it is the type of a distinct genus. We add the diagnosis given by Cantor, and a figure of the upper side of the head, copied from Mr. Hodgson's drawing, and apparently of thrice the natural size:—"Claret-purple above, with metallic lustre; blood-coloured beneath. Ventrals 207; subcaudals 99, the fourteen anterior of which are entire." Valley of Nepal.



ABLABES.

Ablabes, sp., *Dunn. & Bibb.*

Body cylindrical, not compressed, rather slender; head of moderate length, rather depressed, with flat crown, more or less distinct from neck; tail of moderate length or rather long; eye of moderate size, with round pupil. Rostral shield not produced backwards; two nasals; one loreal; one or two anterior and one or two posterior oculars. Scales smooth, in thirteen, fifteen, or seventeen rows; ventrals not angulated; anal bifid; subcaudals two-rowed. Teeth in the jaws and on the palate numerous, small, and of equal size.

The snakes of this genus are small, living on the ground, and are found in North America and in the East Indies. Some of them have been separated into a distinct group under the name of *Enicognathus*, having the notch in the dentary bone placed more forwards than in other snakes; the species referred to our division F. would belong to it. On reconsideration, however, I refer the genus *Trachischium*, which I had established for *A. fuscus* (Colubr. Snakes, p. 30), to *Ablabes*. It was founded on the number of scales, on the peculiarly keeled scales in the ischiadic region, and on the united posterior frontal shields; but these characters appear to me to lose their generic value since I have become acquainted with *A. tenuiceps*, *A. rappii*, and *A. bicolor*, which form connecting links between *Trachischium* and *Ablabes*.

The following species occur in British India:—

- A. *Scales in 13 rows; those of the ischiadic region not keeled; two præoculars.*
 Upper labials seven *A. bañodirus*, p. 224.
- B. *Scales in 18 rows; those of the ischiadic region keeled in the male; one præocular (Trachischium).*
 Anterior and posterior chin-shields equal in size; two posterior frontals *A. tenuiceps*, p. 224.
 Anterior chin-shields much larger than posterior; posterior frontals united into one shield *A. fuscus*, p. 225.
 (*A. obscurorotriatus*, p. 225.)
- C. *Scales in 15 rows.*
 Upper labials six *A. rappii*, p. 225.
- D. *Scales in 17 rows; two præoculars; frontals united into two transverse shields.*
 Two postoculars, one of which is below the eye *A. bicolor*, p. 226.
- E. *Scales in 17 rows; two præoculars; two pairs of frontals.*
 Five upper labials *A. olivaceus*, p. 227.
- F. *Scales in 17 rows; one præocular.*
 A series of black dots along the vertebral line; upper labials seven (eight) *A. sagittarius*, p. 227

- A series of black dots along the vertebral line; upper labials ten,
the eighth excluded from the labial margin *A. humberti*, p. 228.
- A series of black dots along the vertebral line; upper labials ten;
subcaudals 102 *A. collaris*, p. 228.
- Two white bands along the back, each band interrupted by a series
of black spots *A. melanocephalus*, p. 229.

ABLATES BALIODIRUS.

- Coronella baliodeira* (Boie), *Schleg. Phys. Serp.* ii. p. 64. pl. 2. figs. 9, 10. *Cantor, Mal. Rept.* p. 66.
- Ablates baliodeirus*, *Dum. & Bibr.* vii. p. 313. *Günth. Colubr. Snakes*, p. 29.

Scales in thirteen rows. Vertical longer than broad; two præoculars; temporals 1+2, the anterior elongate and in contact with both postoculars. Upper labials seven, the third and fourth of which enter the orbit; the sixth is the largest, and very similar in size and shape to the anterior temporal. Two pairs of elongate chin-shields, the posterior of which are as long as, or even longer than, the anterior; the anterior in contact with four labials. Ventrals 122-132; subcaudals 65-72. Above brownish or black, yellowish on the head; on each side of the anterior part of the trunk a series of equidistant transverse ocellated spots, with white centre and black edge. Labials yellow, edged with black. Uniform pearl-coloured below.

This species belongs to the archipelago, being found in Borneo, Java, and at Pinang. Our longest specimen is 14 inches long, the tail measuring 3½ inches.

ABLATES TENUICEPS.

- Calamaria tenuiceps*, *Blyth, Journ. As. Soc. Beng.* xxiii. p. 288.

Scales in thirteen rows, without apical groove. Rostral shield rather broader than high; anterior frontals broader than long, more than half as large as the posterior; vertical longer than broad, six-sided, the six sides being nearly equal in length, the anterior angle being a right one, the posterior rather pointed; occipitals as long as vertical and posterior frontal together, not reaching the lower postorbital. Nostril between two small nasals; loreal much longer than broad. One præorbital, not extending on to the upper surface of the head; two postorbitals, the upper larger than the lower. Six upper labials, the third and fourth entering the orbit, and the sixth being the largest. Temporals 1+2, the anterior in contact with both oculars. Two pairs of elongate chin-shields, equal in size; the anterior are in contact with four labials. The scales are perfectly smooth, except those on each side of the vent and of the base of the tail, which are keeled. Ventrals 137; anal bifid; subcaudals 39. Above uniform blackish ash; below whitish.

We have seen only one specimen of this species, sent by B. H. Hodgson, Esq., from Nepal; it is 12 inches long, the tail measuring 2 inches. Mr. Blyth's example is from Darjiling, and 14 inches long, of which the tail is 2 inches.

ABLABES FUSCUS.

Calamaria fusca, Blyth, *Journ. As. Soc. Beng.* xxiii. 1854, p. 288.

? *Calamaria obsкуро-striata*, Blyth, *l. c.*

Trachischium rugosum, Günth. *Cobubr. Snakes*, pp. 30, 245.

— *fuscum*, Günth. *Proc. Zool. Soc.* 1860, p. 161.

? — *obsкуро-striatum*, Günth. *l. c.*

Scales in thirteen rows, without apical groove. Posterior frontals united into one shield*; loreal much longer than high; one præocular, not reaching to the upper surface of the head; one postocular. Six upper labials, the third and fourth of which enter the orbit, the last the largest. Temporals 1+2. Two pairs of chin-shields, the posterior much smaller than the anterior, which are in contact with four labials. The scales are smooth; but in the male sex those on the side of the vent and of the root of the tail are keeled, the keels being more or less tubercular; in the females these scales are smooth. Anal bifid. Ventrals: male, 154; female, 161. Subcaudals: male, 42; female, 34. Uniform black above, whitish below.

This is a Himalayan species, being found in Nepal and Sikkim, and reaching an altitude of 8500 feet. It remains small, the largest specimen which came under my observation being 19 inches long, the tail measuring $2\frac{1}{2}$ inches.

In the collection of Messrs. von Schlagintweit there is a single specimen, from Sikkim, 12 inches long, which agrees in some respects with *Calamaria obsкуро-striata* of Blyth, so far as we are able to judge from the short diagnosis given by that gentleman. It is dusky brown, with a pair of very indistinct light bands occupying the joining portions of the fourth and fifth rows of scales; but whilst Blyth states 163 ventrals and 40 subcaudals, I count in the Sikkim specimen 142 ventrals and 29 subcaudals. This circumstance, together with the difference of locality (Blyth's specimen being from Rangoon), makes it very doubtful whether they are identical.

I must even hesitate to identify it with *Trachischium fuscum*; for, in a doubtful case like the present, one is hardly justified in deciding from a single specimen.

ABLABES RAPPII.

Ablabes rappii, Günth. *Proc. Zool. Soc.* 1860, p. 154. pl. 26. fig. B (adult).

— *owenii*, Günth. *l. c.* p. 155. pl. 26. fig. A (young).

Scales in fifteen rows, without apical groove. Loreal square; one præocular, just reaching to the upper surface of the head; two postoculars. The occipital does not extend downwards to the lower postocular; temporals 1+2: the anterior in contact with both oculars; the lower posterior temporal fits into the notch between the upper posterior temporal and the last labial. Upper labials six, the third and fourth of which enter the orbit. Two pairs of oblong chin-shields, subequal in size, the anterior in contact with four labials. Ventrals

* One specimen out of twelve had two posterior frontals.

191-198; anal bifid; subcaudals 60. Uniform blackish above, whitish below: some specimens show a faint dark collar, and a series of vertical bars along the side of the anterior part of the body; these markings are the remaining traces of the coloration of young individuals, the ground-colour of which is light brownish grey, the collar and the lateral vertical bars being black.

The two specimens collected by Messrs. von Schlagintweit are from Sikkim, obtained at altitudes of 5340 and 10,200 feet above the level of the sea. A third example is in Mr. Hodgson's collection from Nepal. It attains to a length of 16½ inches, the tail measuring 3½ inches.

Guided by two rather rough drawings presented by Mr. Hodgson to the British Museum, I was of opinion that *A. rappii* and *A. owenii* were really distinct (Proc. Zool. Soc. 1861, p. 217); but having lately succeeded in finding the typical specimen of one of these drawings, I see that it was intended for a different species (*A. tenuiceps*), and therefore I no longer hesitate to unite the two former.

ABLABLES BICOLOR.

Calamaria bicolor, Blyth, *Journ. As. Soc. Beng.* xxiii. 1854, p. 289.

Scales in seventeen rows. Rostral shield twice as broad as high; the frontals are united into two simple transverse plates; vertical five-sided, broader than long, with the supraciliary margins short, and with a rather acute angle behind; occipitals as long as the vertical and frontals together, rounded behind, and touching the upper postocular only. Nostril between two small shields; loreal square; two preoculars, the lower much smaller than the upper, and entering the orbit with its hinder pointed part only. Two postoculars: the lower is situated below the eye, above the fourth labial. Six upper labials: the third only enters the orbit, and the fifth is the largest. Temporals 1+1: the anterior is in contact with both postoculars, elongate, pointed, meeting the posterior temporal with its pointed end only. Mental shield very small; the first pair of lower labials form a suture behind the mental; two pairs of oblong chin-shields, the posterior rather smaller than the anterior, which are in contact with four labials. Ventrals 210-221; anal bifid; subcaudals 75-80. Uniform greyish brown above, whitish below. Teeth rather small, of equal length, thirteen in the upper and the same number in the lower jaw.

The only specimen I have seen is from the Khasyan collection of the late Mr. Griffith, and is not in a good state of preservation; it is 16½ inches long, the tail measuring 3½ inches. Mr. Blyth's specimen was 19½ inches long (tail 4½), and formed part of a collection which came either from Khasya or from Assam.

ABLABES OLIVACEUS.

Ablates olivaceus, Beddome, Madr. Quart. Journ. Med. Sc. vol. v.

Scales in seventeen rows, short, rounded, without apical groove. Rostral shield large, convex, nearly twice as broad as high, rounded behind, just reaching the upper surface of the head; anterior frontals small, not quite half as large as posterior, broader than long; posterior frontals twice as broad as long, bent downwards on the sides; vertical six-sided, nearly as broad as long, with an obtuse angle in front and with an acute one behind, and with the supraciliary margins very short. Supraciliary small; occipitals as long as the vertical and frontals together, rounded and not notched behind, touching the upper postocular only. Nostril small, in a shield which is divided into two by a suture below, but not above, the nostril. Loreal longer than high. Eye small; two small præoculars, two postoculars; five upper labials: the third forms the lower edge of the orbit; the fourth is the smallest, and the fifth the largest, much longer than high. Temporals 1+1+2. Two pairs of chin-shields, subequal in size, the posterior separated by two intercalated scales. Ventrals 224; anal bifid; subcaudals 75. Teeth small, equal in length, five in each maxillary. Dark greenish olive, paler below; a series of distant, small black dots along each side of the back, and another, less distinct, along the middle of the side.

This species was discovered by Captain R. H. Beddome in the Nilgherries (Manantoddy); the specimen sent by him is 20½ inches long, the tail measuring 4 inches.

ABLABES SAGITTARIUS.

Calamaria sagittaria, Cantor, Proc. Zool. Soc. 1889, p. 49; and Mal. Rept. p. 64.

Enicognathus grayi, Jam, Arch. per la Zool. ii. p. 274.

Scales in seventeen rows; one præocular. The occipital extends laterally to the lower postocular; temporals 1+1, the anterior being in contact with the lower postocular only. Upper labials seven, the third and fourth of which enter the orbit; the second sometimes split into two. Two pairs of longish chin-shields, equal in size, the anterior pair in contact with four labials. Ventrals 216-245; subcaudals 57-70. Reddish or greyish olive, dark on the sides, the lighter coloration of the back being separated from the darker on the sides by a blackish line; a series of black dots along the vertebral line. Head brown above; a broad black or dark-brown collar, edged with yellow. Belly white, each ventral with a black dot on each side (during life the belly is of a citrine colour, with a blue lateral band and with the dots).

This species remains small; the longest specimen we have seen is 12 inches, the tail being one-sixth. It is found at Pinang, and at Tirthoot (Bengal). An example collected by Messrs. von Schlagintweit, at Kangra (Himalayas), differs only in having eight upper labials, the second being split into two. Typical specimens of this species are preserved in the British Museum and in the Museum of the University of Oxford.

ABLATES HUMBERTI.

Calamaria sagittaria, Jerdon, *Journ. As. Soc. Beng.* xxii. 1853, p. 528 (not Cantor).

Enicognathus humberti, Jan, *Arch. per la Zool.* ii. p. 275.

Scales in seventeen rows; one præocular; two postoculars. The occipital extends laterally to the lower postocular; temporals 1+2, the anterior in contact with the lower postocular only. Upper labials ten, the fourth, fifth, and sixth of which enter the orbit; the seventh and ninth are contiguous below, excluding the eighth from the labial margin, so that the latter, situated below the anterior temporal, might be taken for a temporal shield. Two pairs of elongate chin-shields, equal in size, the anterior pair in contact with four labials. Ventrals 175; subcaudals 55-57. Reddish olive, darker on the sides, the lighter back being separated from the dark-coloured side by an indistinct punctated line. A series of black dots edged with yellow runs along the vertebral line. Upper part of the head brown; a broad black or dark-brown collar, edged with yellow. Belly white, each ventral shield with a black dot on each side.

This species is found in the Madras Presidency and in Ceylon. Our largest specimen is $17\frac{1}{2}$ inches long, the tail measuring 4 inches.

ABLATES COLLARIS.

Psammophis collaris, Gray, *Ann. & Mag. Nat. Hist.* 1853, p. 390.

Ablates collaris, Günth. *Catubr. Snakes*, p. 28.

Scales in seventeen rows. Loreal rather longer than high; one præocular, just reaching to the upper surface of the head; two postoculars. The occipital does not extend downwards to the lower postocular; one temporal in front, in contact with both postoculars; a second elongate temporal behind the first, contiguous to the occipital; two smaller temporals, one behind the other, occupy the space between the second temporal and the posterior labial shields. Upper labials ten, the fourth, fifth, and sixth entering the orbit, the eighth and tenth being the largest. Two pairs of elongate chin-shields, subequal in size, the anterior in contact with four labials. Ventrals 177; anal bifid; subcaudals 102. Teeth small, closely set, of equal size, 28 in each maxillary and 46 in each mandible*. Greyish brown above, with a vertebral series of equidistant black dots on the anterior part of the trunk. Neck with a broad black collar, edged with yellow behind, the yellow edge being produced forwards to the eye; head brown above; labials brown-spotted. Lower parts white; each ventral with a black speck on each side; anterior ventrals with another pair of similar dots in the middle.

This species is found in Khasya and Nepal, and attains to a length of 32 inches, the tail measuring 10 inches.

* The notch of the dentary is below the nineteenth tooth.

ABLABES MELANOCEPHALUS.

Lygodon melanocephalus, Gray, *Ind. Zool. c. fig.*

Herpetodryas prionotus, Cantor, *Proc. Zool. Soc.* 1889, p. 52.

Ablabes melanocephalus, Günth. *Cobubr. Snakes*, p. 28.

Scales in seventeen rows. Loreal square; one præocular, two postoculars; the occipital extends laterally to the lower postocular; one temporal in front, in contact with the lower postocular only; a second elongate temporal behind the first, contiguous to the occipital; two or three smaller scale-like temporals between the second temporal and the posterior labial shields. Upper labials ten, the fourth, fifth, and sixth entering the orbit; the seventh and ninth are contiguous below, excluding the eighth from the labial margin, so that the latter, situated below the anterior temporal, might be taken for a temporal shield. Two pairs of oblong chin-shields, subequal in size, the anterior in contact with four labials. Ventrals 152; anal bifid; subcaudals 65. Teeth small, closely set, of equal size, 37 in each maxillary and 34 in each mandible. Light brown above, with two white longitudinal bands, commencing from a broad black collar, and becoming indistinct towards the hinder parts of the body; each band is interrupted by a series of quadrangular, equidistant black spots; head brown above; lips yellow, with a black band running from the eye to the angle of the mouth. Lower parts whitish, each ventral with a black spot on each side.

The typical specimens are from General Hardwicke's collection; the place where they were collected is not known. The typical specimen of Cantor's *Herpetodryas prionotus* appears to be lost; but, fortunately, a drawing of it has been preserved in the Oxford Museum, which proves its identity with *A. melanocephalus*. Cantor says that it inhabits Malacca. The species attains to a length of 22 inches, the tail measuring 8 inches.

CYCLOPHIS, *Gthr.*

Body or tail or both rather slender; belly rounded; head of moderate length, rather distinct from neck. Shields of the head regular; loreal present, or confluent with the nasal; only one nasal, pierced by the nostril; one (two) anterior and two posterior oculars. Scales smooth, in fifteen rows. Eye of moderate size, or rather large, with round pupil. All the teeth of equal size, none grooved.

The snakes of this genus are small species—intermediate forms between the *Coronellina* and the *Dryadina*; like the former, they appear to be ground snakes, frequenting grassy plains rather than dry places; therefore their predominant colours are green or olive. One

species is known from North America; the others are from the Indian continent and from Ceylon.

Uniform green	<i>C. major</i> , p. 280.
Anterior part of the body with black longitudinal bands	<i>C. frenatus</i> , p. 280.
Loreal united with nasal; one præocular	<i>C. calamaria</i> , p. 231.
Loreal united with nasal; two præoculars	<i>C. nasalis</i> , p. 231.
Loreal distinct. A bright yellow collar	<i>C. monticola</i> , p. 282.

CYCLOPHIS MAJOR. (Plate XVII. fig. L.)

Cyclophis major, Günth. *Colubr. Snakes*, p. 120.

Herpetodryas chloris, Hallow. *Proc. Acad. Nat. Sc. Philad.* 1860, p. 503.

Body and tail of moderate length, not compressed; head rather narrow, of moderate length, scarcely distinct from neck; eye of moderate size. Rostral shield small, as high as broad; anterior frontal subtriangular, as long as broad, obtusely pointed in front. Vertical much longer than broad, with the lateral margins but little convergent. Nostril rather wide, nearly entirely dividing the single nasal; loreal much longer than high; præocular extending to the upper surface of the head, but not reaching the vertical; two postoculars; eight upper labials, the fourth and fifth entering the orbit; temporals elongate, 1+2. Two pairs of chin-shields: the anterior elongate, subsemicircular, in contact with four lower labials; the posterior narrow, strongly divergent. Scales smooth, without apical groove, ovate, not elongate, in fifteen rows. Ventrals 175, without keel and not extending up the sides; anal bifid; subcaudals 78-86. Uniform green above, paler beneath.

Specimens of this snake have been received from Ningpo and Hongkong. Our largest specimen is $37\frac{1}{2}$ inches long, the tail measuring 9 inches; another is $30\frac{1}{2}$ inches long, tail 7 inches.

CYCLOPHIS FRENATUS. (Plate XIX. fig. I.)

Cyclophis frenatus, Günth. *Colubr. Snakes*, p. 120.

Body and tail somewhat elongate, slightly compressed; head distinct from the slender neck, broad between the eyes, with short snout; eye of moderate size. Rostral broader than high; anterior frontals much broader than long, subquadrangular, truncated in front, not quite half as large as posterior; vertical broad in front, with the lateral margins much convergent; superciliaries broad behind; occipitals longish, rounded behind. One anterior ocular, not extending on to the upper surface of the head; two postoculars. Loreal square. Seven upper labials, the third and fourth forming the lower part of the orbit; temporals large, 1+2. Two pairs of elongate chin-shields, the anterior being in contact with four labials. Scales smooth, without apical groove, rhombic, rather short, in fifteen rows. Ven-

trials 165, without keel, slightly bent up the sides; anal bifid; subcaudals 95. Crown of the head, back, and posterior part of the body uniform olive; a broad black band begins behind the eye, becomes gradually narrower, and disappears in the second fifth of the total length; a second streak or zigzag line runs from the throat along the outer edges of the ventrals; a third is intermediate between the band and the zigzag line, and disappears with the first. Uniform yellowish below.

We have received one specimen from Afghanistan and another from Mesopotamia. The first is 27 inches long, the tail measuring 8 inches.

CYCLOPHIS CALAMARIA. (Plate XVII. fig. K.)

Cyclophis calamaria, Günth. *Columb. Snakes*, p. 250.

Body of moderate length, not compressed; tail rather long; head of moderate length, with obtusely conical snout, scarcely distinct from neck. Rostral shield as high as broad; anterior frontals rather broader than long, not quite half as large as posterior; posterior frontals much broader than long. Vertical twice as long as broad, with the lateral margins slightly convergent; occipitals of moderate length, rounded behind. Loreal none. Nasal shield large, long, replacing the loreal, in contact with the preocular; the nostril is small, situated in its anterior half. One preocular, not extending on to the upper surface of the head; two postoculars. Seven upper labials, the third and fourth forming the lower part of the orbit. Temporals large, 1+2. Two pairs of elongate chin-shields, the anterior being in contact with four labials. Scales smooth, some with a very indistinct single apical groove, oblong, ovate, in fifteen rows. Ventrals 129-132, scarcely bent up the sides; anal bifid; subcaudals 64-83. Greyish or brownish grey above; each scale on the sides with two indistinct, very small brown streaks on the base; the scales on each side of the back are edged with black, the black edges forming small irregular spots, which are more or less confluent into a very narrow undulated line on the hind part of the body; lower parts entirely white. In immature specimens the black lines are more distinct than in old ones, extending further backwards on the body: a young specimen, 4 inches long, has a broad black band across the hind part of the occipitals.

This small snake is not uncommon in Ceylon, but scarcer in the peninsula of India, and attains to a length of 13-14 inches, the tail measuring 4 inches. We have given three views of the head, of the natural size.

CYCLOPHIS NASALIS. (Plate XVII. fig. M.)

This species agrees in almost every respect with *C. calamaria*, but it may be readily distinguished by the presence of two preoculars; the nasal shield is very large and long. Ventrals 149; anal bifid; subcaudals 77. Greyish olive above; a slightly curved black streak on

each side of the neck, followed by a series of black spots, which are confluent into a more or less interrupted band which runs along the joining edges of the fifth and sixth outer series of scales and gradually disappears on the tail; an indistinct black line runs between the third and fourth series of scales and disappears on the anterior third of the trunk. Belly uniform whitish.

I have examined only a single specimen of this species; it is not known from what part of British India it came; it is 16 inches long, the tail measuring 4 inches. We have given a lateral view of the head, of the natural size.

CYCLOPHIS MONTICOLA.

Calamaria monticola, Cantor, *Proc. Zool. Soc.* 1839, p. 50.

Body rounded, of moderate length; tail rather short; head rather narrow, not depressed, with the snout of moderate length, obtusely conical. Eye of moderate size, with round pupil. Rostral shield narrow, much higher than broad, reflected on to the upper surface of the head, with an obtuse angle behind. Anterior frontals twice as broad as long, about one-third the size of posterior; posterior frontals subrhomboidal, rather broader than long. Vertical six-sided, much longer than broad, with an obtuse angle in front and with a right angle behind, the lateral margins being nearly parallel; supraciliaries well developed, elongate, rather narrow; occipitals long, as long as vertical and posterior frontals together, rounded behind. Nostril an oblique slit, directed forwards, in a single nasal plate of moderate size, which is not much larger than the loreal. Loreal oblong, longer than high, rather larger than the single præorbital, which does not extend upwards to the upper surface of the crown. Two postoculars, subequal in size. Six upper labials, the third and fourth entering the orbit: the third is in contact with loreal and præocular, and forms the anterior angle of the orbit; the fourth is below the centre of the eye; the sixth upper labial is the largest, and as large as the fourth and fifth together. Temporals 1+1: the anterior is elongate, and in contact with both postoculars; the posterior is short, rhombic. Six lower labials on each side: the first pair form a suture together behind the mental. Two pairs of elongate chin-shields, each being more than twice as long as broad; the anterior in contact with four labials. Scales smooth, in fifteen rows; ventrals 125; subcaudals 44; anal bifid. All the teeth subequal in size, about nineteen in each maxillary. Dark olive-brown, with a bright yellow collar and with a whitish dorsal line; beneath of a citrine colour.

This description is taken from the typical specimen, which is still preserved in the Oxford Museum; it is only 50 lines long, the tail measuring 9 lines. This species inhabits the Naga Hills in Assam.

ODONTOMUS, *Dum. & Bibr.*

Body and tail slender, strongly compressed; head of moderate size and width, depressed, distinct from neck; ventrals more than 200 in number, angularly bent on the sides. Scales in thirteen or fifteen rows, smooth. Shields of the head regular; nostril in a nasal shield which is divided into two by a more or less distinct suture. Two præoculars, the lower of which is sometimes united with the loreal. Maxillary and palatine teeth subequal in length, none grooved; the anterior mandibular teeth but little larger than the following. Eye of moderate size, with round pupil.

Having previously seen only two specimens of *Odontomus*, in an indifferent state of preservation, I adopted the diagnosis given by Duméril and Bibron, and placed these snakes in the family of *Lycodontidae* (Colubr. Snakes, p. 206); but I have since convinced myself that their dentition is very different from what I supposed it to be from Duméril's description, and that their natural place is near *Dryocalamus*.

The following species occur in British India:—

Scales in thirteen rows; upper labials eight	<i>O. nympha</i> , p. 233.
Scales in thirteen rows; upper labials seven	<i>O. semifasciatus</i> , p. 234.
Scales in fifteen rows	<i>O. gracilis</i> , p. 234.

ODONTOMUS NYMPHA.

Russell, Ind. Serp. ii. tab. 36, 37.

Coluber nympha, *Daud. Rept.* vi. p. 244.

Lycodon nympha, *Boie, Isis*, 1827, p. 522. *Schleg. Phys. Serp.* ii. p. 120.

Odontomus nympha, *Dum. & Bibr.* vii. p. 450.

Rostral shield low, nearly twice as broad as high. Anterior frontal subquadrangular, as long as broad, more than half as large as posterior. Posterior frontal broader than long; vertical and occipitals of moderate size, the latter rounded behind. Nasal subdivided; the loreal is generally united with the lower præocular, entering the orbit, but there is sometimes a lower detached præorbital; the upper reaches just to the upper surface of the head. Two postoculars. Eight upper labials, the third and fourth of which enter the orbit. Temporals 2+3: the anterior narrow, elongate, in contact with the postoculars. Scales in thirteen rows, with an apical groove; ventrals 234-243; anal bifid; subcaudals 82-87. Maxillary teeth small, subequal in size; palatine teeth not prolonged; the anterior of the mandible are but very little longer than the posterior. White, with about thirty-eight

rounded, broad brown bands, each of which is about thrice as broad as the intervals of the ground-colour; the first occupies the head, the second the neck, both being separated by a white collar. The head appears to be sometimes entirely yellowish.

The specimens which I have examined are from Russell's collection; he obtained them from Vellore; the largest is 17 inches long, tail $3\frac{1}{2}$ inches.

ODONTOMUS SEMIFASCIATUS.

Hydrophobus semifasciatus, Günth. *Ann. & Mag. Nat. Hist.* 1862, Febr., p. 127. pl. 9. fig. 6.

Rostral shield of moderate size, somewhat broader than high; anterior frontals subquadrangular, nearly as broad as long, more than half the size of the posterior. Posterior frontal broader than long; vertical and occipitals of moderate size, the latter rounded behind. Nasal subdivided, a suture below the nostril being very indistinct. Loreal rather longer than high. Two præoculars equal in size, the upper just reaching to the upper surface of the head; two postoculars. Seven upper labials, the third and fourth of which enter the orbit. Temporals $2+2+2$: the two anterior are in contact with the postoculars, and that on the side of the hind portion of the occipital is elongate, twice the size of the others. Scales in thirteen rows, with an apical groove; ventrals 232; anal bifid; subcaudals 84. Maxillary teeth small, equal in size; palatine teeth not elongate. White, with fifty rounded, dark-brown bands, each of which is about twice as broad as the intervals of the ground-colour; the first occupies the head, the second the neck, both being separated by a white collar.

I have seen only one example of this species, and I do not know whence it was obtained. It is young, 75 lines long, the tail being 27 lines. Having formerly followed Duméril and Bibron in placing *Odontomus* among the Lycodonts, I did not at first recognize the generic affinities of the present species, considering it as the type of a distinct genus.

ODONTOMUS GRACILIS.

Rostral shield low, twice as broad as high, slightly bent backwards on the upper surface of the head. Anterior frontal quadrangular, as long as broad, two-thirds the size of posterior; posterior frontal much broader than long. Vertical not much longer than broad; occipitals of moderate size. Two nasals; loreal united with lower præocular, entering the orbit; upper præocular small; two postoculars. Eight upper labials, the third and fourth of which enter the orbit. Temporals $2+3(+3)$, the two anterior in contact with the postoculars. Scales in fifteen rows, without apical groove; ventrals 234; anal entire; subcaudals 81-83. Each maxillary is armed with nine teeth of moderate size and in a continuous series; they gradually become somewhat longer behind; palatine teeth small; anterior mandibular teeth a little longer than the posterior. White, with about thirty-eight broad, round, dark-brown cross bands, thrice or twice as broad as the interspaces of the ground-colour; these interspaces

again are marbled with brown; the first cross band occupies the head, the second the neck, both being separated by a white collar. Lower parts uniform white.

A single specimen was brought to this country by Captain B. H. Beddome from the Anamallay Mountains; it is 21 inches long, the tail measuring 4 inches. Another specimen is figured in Mr. W. Elliott's collection of drawings; it was killed at Waltair.

NYMPHOPHIDIUM, *Gthr.*

This genus agrees with *Odontomus* in every respect but the dentition, the three posterior maxillary teeth being very strong and trenchant; neither the palatine nor the mandibular teeth are enlarged.

I know of only one species.

NYMPHOPHIDIUM MACULATUM. (Plate XIX. fig. H.)

Head of moderate width and length, rather depressed, and distinct from neck; body and tail slender, compressed. Rostral rather broader than high, just reaching the upper surface of the head; anterior frontals quadrangular, as long as broad, obliquely truncated in front, more than half as large as posterior; posterior much broader than long; vertical of moderate size, with the lateral margins slightly convergent; occipitals as long as vertical and posterior frontals together, slightly notched behind. Nostril between two small nasals, indistinctly separated by a suture; loreal long, quadrangular, entering the orbit; a small præorbital above; two postorbitals; seven upper labials, the third and fourth entering the orbit. Temporals rather irregularly arranged, two being in contact with the postoculars. Scales smooth, in fifteen rows. Ventrals 244; anal entire; subcaudals 107. Each maxillary is armed with a continuous series of six or seven teeth, the three last of which are comparatively very strong and trenchant. There are two obtusely conical prominences on the base of the skull, one behind the other, not covered by the mucous membrane of the cavity of the mouth; their white colour makes them very conspicuous. The specimen is now light brownish, with two dorsal series of rounded dark-brown spots; they are confluent into one series on the anterior part of the body, and become smaller on the posterior and on the tail; sides with very small brown spots; lower parts uniform whitish.

The only specimen I have seen is from General Hardwicke's collection, and marked "India"; it appears to be young, being only 12 inches long, the tail measuring $2\frac{3}{4}$ inches.

We have given on Plate XIX. two views of the head, of twice its natural size, and a figure of a portion of the back from the anterior third of the length, of the natural size, to show its coloration.

CORONELLA.

Coronella, sp., *Laurenti*.

Body cylindrical, not compressed in the middle, stout; head of moderate length, rather flat, and distinct from neck, with the snout rounded; tail of moderate length; eye moderately large, with round pupil. Rostral shield of normal size and form; two pairs of frontals; nostril between two nasals; one loreal; one anterior and two or three posterior oculars. Scales smooth, in (fifteen) seventeen to twenty-three rows; subcaudals two-rowed. Posterior maxillary tooth longest, smooth, and in a continuous series with the anterior ones, or grooved.

Although species of this genus were known from almost every part of the temperate and tropical regions, they were thought to be entirely absent in tropical India; therefore, when I saw the first specimen said to be from the Dekkan, I was much tempted to doubt the correctness of the statement. The British Museum received that specimen from the collection of the East India Company; and although an error may have occurred, I do not feel myself entitled to presume that such is really the case, more especially as the species is apparently undescribed.

CORONELLA ORIENTALIS.

Head rather depressed, of moderate length, scarcely distinct from neck; body rounded, slightly compressed posteriorly; tail of moderate length. Eye of moderate size, with round pupil. Rostral shield rather broader than high, just reaching the upper surface of the head; frontals of moderate size; vertical not quite twice as long as broad, with the lateral margins parallel, and with a pointed posterior angle; occipitals not much longer than vertical. Nostril between two nasals; loreal square; one præorbital, reaching to the upper surface of the head; two postorbitals, the lower between the eye and the fifth and sixth labials. Eight upper labials, the fourth and fifth entering the orbit; temporals 1 + 2, the anterior in contact with both oculars. Two pairs of elongate chin-shields, the posterior rather shorter than the anterior, which are in contact with five labials. Scales in seventeen rows, without apical groove. Ventrals 163; anal bifid; subcaudals 65. Each maxillary is armed with sixteen teeth, the last of which is twice as strong as the preceding, and not separated from it by an interspace. Above greyish brown; two indistinct narrow dark streaks along each side of the posterior part of the trunk, confluent into one band on the side of the tail. Neck with a very narrow white collar. Belly white, with subquadrangular blackish spots.

Total length 11 inches; head $\frac{1}{2}$ inch; tail 2 inches.

A single specimen was transferred from the collection of the East India Company to that of the British Museum, and is stated to belong to the collection made by Colonel Sykes in the Dekkan.

COLUBER.

Coluber, sp., Linn.

Body rounded above, generally of moderate length; tail one-fifth or less than one-fifth of the total length; eye of moderate size, with round pupil; nostril lateral, between two plates. Shields of the head regular; one præ-ocular. Scales smooth or with feeble keels, in nineteen to twenty-seven rows; ventrals not keeled; anal bifid. Teeth in the jaws of equal size.

Numerous species of this genus are found in North America, Europe, and Asia; those in British India belong to the northern parts of this region, scarcely extending southwards into the tropical region.

* *Anterior frontals pointed in front; less than 200 ventrals.*

Scales in twenty-one rows *C. rufodorsatus*, p. 238.

** *Anterior frontals obtuse in front; more than 200 ventrals.*

Scales in twenty-three rows *C. mandarinus*, p. 238.

Scales in nineteen rows *C. porphyraceus*, p. 239.

I am quite at a loss as to where the *Platyceph semifasciatus*, Blyth, Journ. As. Soc. Beng. xxix. 1861, p. 114, should be placed; no mention is made either of the shields of the head or of the scales. The genus is characterized as follows:—

PLATYCEPH, n. g.—Like *Coluber* (*Coryphodon*, D. & B.), but with exceedingly flat head, and tail only about a sixth of the total length.

PL. SEMIFASCIATUS.—Colour olive-grey above, white below; the posterior two-fifths without markings, and the nuchal region marked with broad transverse black bands, having lateral black spots alternating on either side. These gradually become narrower and are broken into alternate bands on the second fifth of the body, being still more broken into small spots on the third fifth, beyond which they gradually disappear anterior to the vent. Eyes of moderate size. Specimen evidently young. Length about 10½ inches, of which tail about 2 inches, its extreme tip being lost in the specimen. Ventral shields 187.—Subathoo.

COLUBER RUFO-DOREATUS. (Plate XX. fig. G.)

Tropidonotus rufo-dorsatus, Cantor, *Ann. & Mag. Nat. Hist.* 1842, ix. p. 483.

Ablabes sex-lineatus, Dum. & Bibr. vii. p. 324.

Coluber rufo-dorsatus, Günth. *Colubr. Snakes*, p. 89.

Body and tail stout; head rather short, high, scarcely distinct from neck; snout obtusely pointed, with a sharpish canthus rostralis. Rostral broader than high; anterior frontals small, triangular, pointed in front. Vertical not twice as long as broad, with the lateral margins but little convergent, and with a right angle behind; occipitals of moderate length and width, rather rounded behind. One præocular, extending to the upper surface of the head; two postoculars. Seven upper labials, the third and fourth entering the orbit. Temporals varying in form and number. Scales smooth, with an indistinct apical groove, in twenty-one rows. Ventrals 174-178; anal bifid; subcaudals 50-52 in males as well as in females. Each maxillary with fifteen teeth, which gradually become rather larger behind. Upper parts brownish grey, with four series of oblong, irregular, brown, black-edged spots, the spots of each series being confluent in the middle of the trunk, and forming four bands continued to the tip of the tail; head with three A-like bands: the anterior across the posterior frontals, running through the eye to the angle of the mouth, and passing into the lateral series of spots; the second crosses the vertical and the occipitals; the third is in the occipital suture. A series of black spots along the edge of the abdomen; belly with more or less numerous and confluent subquadrangular black spots.

This species is found in China (Ningpo, Chikiang) and in the islands of Chusan and Formosa. An adult male and female measured 19 inches, the tail of both being 3 inches. I found a frog in the stomach of one.

Two views of the head, of its natural size, are given on Plate XX.

COLUBER MANDARINUS. (Plate XX. fig. H.)

Coluber mandarinus, Cantor, *Ann. & Mag. Nat. Hist.* 1842, ix. p. 483.

Body and tail of moderate length; head rather narrow, oblong, scarcely distinct from neck; snout subtruncated. Rostral shield nearly twice as broad as high; anterior frontals quadrangular, broader than long, with the anterior margin not much shorter than the posterior. Vertical five-sided, broader than long, with the lateral margins convergent, and with a rather acute angle behind. Occipitals of moderate length and width, rounded behind. Loreal small; præocular just reaching to the upper surface of the head; two postoculars. Seven upper labials, the third and fourth entering the orbit. Temporals 1+3. The anterior chin-shields in contact with four lower labials. Scales smooth, with an indistinct apical groove, in twenty-three rows. Ventrals not keeled, extending a little up the sides, 222; anal bifid; subcaudals 62. Each maxillary is armed with fifteen teeth equal in size. Scarlet above (brownish olive in spirits), with a dorsal series of about forty-four lozenge-shaped black spots,

each with a yellow centre and a narrow yellow margin; irregular black spots along the sides. Head with black cross bands: one across the anterior frontals and the first upper and second lower labials; a second runs across the fronto-vertical suture, and passes through the eye to the lower jaw; the third is V-like, and occupies the crown of the head; another black spot on the suture between the fifth and sixth upper labials; belly with numerous black cross bands, generally interrupted in the middle.

This beautiful species is an inhabitant of the island of Chusan; the largest specimen I have seen is 28 inches long, the tail measuring 5 inches. Three views of the head are given on Plate XX.

COLUBER PORPHYRACEUS. (Plate XX. fig. I.)

Coluber porphyraceus, Cantor, *Proc. Zool. Soc.* 1839, p. 51.

Psammophis nigrofasciatus, Cantor, *l. c.* p. 53 (young).

Coronella callicephalus, Gray, *Ann. & Mag. Nat. Hist.* 1853, xii. p. 390. *Blyth, Journ. As. Soc.*

Beng. xxiii. 1855, p. 289.

Coluber callicephalus, Günth. *Colubr. Snakes*, p. 92.

Body and tail of moderate length; head narrow, oblong, scarcely distinct from neck; snout rather long. Rostral as broad as high; anterior frontal truncated in front, rather broader than long, its anterior margin being shorter than its posterior. Vertical very large, rather longer than broad, six-sided, with an obtuse angle in front and a right angle behind, and with the lateral margins convergent; occipitals considerably longer than broad, obliquely truncated behind. Loreal rather longer than high; one præorbital, extending on to the upper surface of the head, in contact with the vertical; two small postorbitals; temporals elongate, 1+2, the anterior in contact with the lower ocular only. Eight upper labials, the fourth and fifth entering the orbit. The anterior chin-shields in contact with four lower labials. Scales smooth, without apical groove, in nineteen series. Ventrals scarcely extending upwards on the sides, 189-211; anal bifid; subcaudals 66-70. Each maxillary is armed with sixteen teeth equal in size. Brownish olive above, with about twenty-two very broad, darker, black-edged cross bands; a narrow black streak commences behind the middle of the trunk, and runs along each side of the back to the tip of the tail. Crown of the head with a black median longitudinal streak; a second runs from behind the orbit to the first cross band. Belly uniform whitish. In the young the cross bands are entirely black, edged with white, reaching downwards to the belly.

This very fine species appears to be confined to Khasya and Assam; our largest specimen is 29 inches long, the tail measuring 5½ inches. Two views of the head are given on Plate XX.

I have examined a coloured drawing of Cantor's *Coluber porphyraceus*, and the typical specimen of his *Psammophis nigrofasciatus*, both being preserved in the Museum of the University of Oxford.

ELAPHIS.

Elaphis, sp., *Aldrovandi*.

Body and tail generally elongate and compressed; ventral shields 200 or more in number; head distinct from neck; the length of the tail is less than one-fourth of the total; eye of moderate size, with round pupil; nostril lateral, between two shields; shields of the head regular; two præoculars, the lower small. Scales keeled; ventrals with a slight, or without any, keel; anal bifid. Maxillary teeth equal in size.

The species of this genus belong to the European and Asiatic faunas; the following are found in British India:—

- Upper side of the head with oblique cross bands edged with black *E. dione*, p. 240.
 Head uniformly coloured above; trunk with broad cross bands anteriorly; tail
 without band *E. sauromates*, p. 241.
 Tail with a broad black lateral band *E. tanisurus*, p. 242.

ELAPHIS DIONE.

Coluber dione, *Pall. Zoogr. Ross.-As.* iii. pp. 39, 40.

Cœlopeltis dione, *Eichw. Nouv. Mém. Nat. Mosc.* 1842, vii. p. 151, tab. 28.

Elaphis dione, *Dum. & Bibr.* vii. p. 248. *Günth. Colubr. Snakes*, p. 92.

Body of moderate length, compressed; head and tail of moderate length; snout obtusely rounded. Rostral broader than high; anterior frontals half as large as posterior, pentagonal, with two anterior margins. Vertical rather large, pentagonal, with the lateral margins convergent, and with a rather acute angle behind. Occipitals somewhat longer than vertical, slightly pointed behind. Loreal rather longer than high; two præoculars, the lower of which is small, the upper extending on to the upper surface of the head, but not reaching the vertical. Two postoculars. Eight low upper labials, the fourth and fifth of which enter the orbit. Temporals 2+3, the posterior scale-like. Scales on the back slightly keeled, in twenty-five series. Ventrals 200–203, scarcely bent upwards on the sides; anal bifid; subcaudals 63–78. Each maxillary is armed with from ten to twelve teeth of equal size. Upper parts brownish or yellowish olive, minutely speckled with red; two series of irregular black rings along the back, the rings of the two series sometimes confluent and forming transverse markings; generally a light band along each side of the back, and sometimes a third along the vertebral line, dividing the two series of rings. Sides with two other series of irregular small black spots. Head with brown oblique cross bands edged with black; generally only the black edges are visible: one across the anterior frontals, bent backwards to the eye;

the second on the fronto-vertical suture; both these cross bands are united into one behind the eye, running from the orbit to the angle of the mouth; a third large blotch occupies the crown of the head, emitting two divergent streaks behind. Belly white with black spots, the spots being sometimes small, sometimes subquadrangular, and occupying more than one-half of the ventral and subcaudal shields.

This species was known from the western parts of Asia, but it appears to extend through entire Central Asia to China, where (at Peking) it has been found by Mr. Swinhoe. These Chinese specimens agree completely with others collected at the foot of the Caucasus. Our longest specimen is a male, 39 inches long, the tail measuring $8\frac{1}{2}$ inches.

ELAPHIS SAUROMATES. (Plate XXI. fig. E.)

Coluber sauromates, Pall. *Zoogr. Ross.-As.* iii. p. 42. Nordm. in Demid. *Voy. Russ. Méri.*, Rept. pl. 7.

Elaphis pareyasii, (Flz.) *Wagl. Icon.* tab. 25.

Tropidonotus sauromates, Eichw. *Faun. Casp.-Caucas.* pl. 25. figs. 1 & 2.

Elaphis sauromates, Dum. & Bibr. vii. p. 288. Günth. *Colubr. Snakes*, p. 93.

Body and tail of moderate length, the former scarcely compressed; head rather depressed, flat, with the snout obtusely rounded; eye of moderate size, superciliary somewhat projecting. Rostral broader than high; anterior frontals more than half as large as posterior; vertical pentagonal, with the lateral margins convergent. Occipitals of moderate extent. Loreal longer than high; two præoculars, the lower of which is small, the upper extending on to the upper surface of the head, but not reaching the vertical. Two postoculars. Eight low upper labials, the fourth and fifth coming into the orbit. Temporals 2+3, the anterior somewhat elongate. The anterior chin-shields are in contact with four lower labials. Scales keeled, in 23-25 series. Ventrals 204-214, slightly bent upwards on the sides; anal bifid; subcaudals 64-82. Each maxillary is armed with ten to fourteen teeth of equal size. Anterior part of the trunk with broad black cross bands, separated from each other by narrow yellow interspaces, and more or less confluent on the hinder part of the trunk. In the Chinese variety the scales within the black cross bands and on the posterior half of the trunk and on the tail have a yellow central streak or spot, whilst the scales between the bands are yellow with a black central streak. A black temporal band in specimens from Western Asia, absent in the Chinese variety, which has the head-shields yellow, edged with black. Belly yellow; in the Chinese specimen marbled with black, and entirely black posteriorly.

This species appears to have the same geographical range as *E. dione*, viz. from the shores of the Caspian Sea to the most eastern parts of China. Our specimen is from Ningpo, and having compared it with an example from Shirvan, presented by Professor Peters to the British Museum, I do not, at present, consider the differences between them of sufficient value to distinguish them specifically. It has the scales very strongly keeled, and is 67 inches long, the tail measuring 12 inches. I have given two views of its head, of the natural size.

ELAPHIS TENIURUS.

Elaphis virgatus, var. (spec. c.), Günth. *Colubr. Snakes*, p. 95.

— *taniurus*, Cope, *Proc. Acad. Nat. Sc. Philad.* 1860, p. 565.

Body rather slender, compressed; tail of moderate length; head narrow, with rather long snout. Rostral scarcely broader than high; anterior frontals obtusely rounded in front, not quite half as large as posterior. Vertical nearly twice as long as broad, with parallel lateral margins and with a posterior right angle. Occipitals somewhat longer than vertical, somewhat rounded behind. Loreal rather longer than high; two præoculars, the lower small, the upper extending to the upper surface of the head, but not reaching the vertical. Two postoculars. Eight low upper labials, the fourth and fifth of which enter the orbit. Temporals rather irregular, generally 2+3, the two anterior being elongate, in contact with the postoculars. Anterior chin-shields in contact with six lower labials. Scales on the back slightly keeled, in twenty-five series. Ventral shields 230-232; anal bifid; subcaudals 98-101. Each maxillary is armed with sixteen or seventeen teeth of equal size. Back greenish olive, assuming a yellowish hue on the hinder part of the trunk, this colour being narrowed into a yellow band running along the back of the tail. Sides of the body greyish olive, variegated with blackish and with a narrow, subinterrupted black longitudinal line above. The sides of the trunk become gradually entirely brownish black behind, this colour being narrowed into a black band running along the side of the tail; a white band separates this lateral band from the ventral and subcaudal shields. Numerous black streaks cross the anterior part of the trunk. Belly whitish, checkered with black along the edges of the abdomen, the black spots forming posteriorly a continuous band running along each side of the belly and of the subcaudals. Head without any spots, but with a deep-black streak from the eye to the angle of the mouth.

This species is closely allied to the Japanese *E. virgatus*, which is represented by it in China (Ningpó, Chikiang), and, according to Cope, also in Siam. It attains to a length of more than 5 feet, the tail measuring one-fifth.

COMPSOSOMA.

Compsosoma, sp., *Dum. & Bibr.*

Body elongate, compressed; ventral shields more than 200 in number; head narrow, with the snout rather elongate; tail about one-fifth of the total length; eye of moderate size, with round pupil; nostril lateral, between two plates; the shields of the head have a tendency to unite; one anterior ocular (exceptionally two in *C. reticulare*). Scales keeled, in 19-23 series; ventrals with a slight, or without any, keel; anal entire, except in *C. hodgsonii*. Teeth numerous in the jaws and on the palate, equal in size.

This genus, thus limited, forms a more natural group than when united with its American allies under the name of *Spilotes*. All the species are Indian, and distinguished by a narrow head with a long, anteriorly truncated snout; they are the following:—

- Scales in nineteen rows; a black streak crosses the extremity of the occipitals. *C. radiatum*, p. 243.
 Scales in nineteen rows; tail and hinder part of the body black *C. melanurum*, p. 244.
 Scales in twenty-one rows; blackish or brownish, with numerous narrow, reticulated whitish cross bands *C. reticulare*, p. 245.
 Scales in twenty-three rows *C. hodgsonii*, p. 246.

COMPSOSOMA RADIATUM.

Russell, Ind. Serp. ii. tab. 42.

Coluber radiatus (*Reine.*), *Schleg. Phys. Serp.* ii. p. 135. pl. 5. figs. 5, 6. *Cantor, Mal. Rept.* p. 73.

— *quadrifasciatus*, *Cantor, Proc. Zool. Soc.* 1839, p. 51.

Tropidonotus quinque, *Cantor, Proc. Zool. Soc.* 1839, p. 54.

Compsosoma radiatum, *Dum. & Bibr.* vii. p. 292.

Body and tail elongate, compressed; head narrow, flat, rather distinct from neck; snout rather long, obtusely rounded. Rostral shield broader than high; anterior frontals of moderate size, not quite half as large as posterior, subquadrangular, broader than long. Vertical five-sided, very broad in front, its anterior margin being rather longer than the lateral; lateral margins strongly convergent; hinder margins meeting at a right angle. Occipitals longer than vertical, obliquely truncated behind. Loreal longer than high; one anteorcular, large, extending to the upper surface of the head, nearly to the vertical; two postoculars. Nine low upper labials, the fourth, fifth, and sixth entering the orbit; the third and fourth, or the fourth and fifth, are sometimes confluent into one shield. Temporals generally 2+2+3; the anterior are elongate, and the upper alone is in contact with the postoculars. Scales rhombic, not elongate, in nineteen rows, those of the dorsal series keeled. Ventrals 222-248; anal entire; subcaudals 82-94. The ventrals have an obtuse

lateral keel, and are bent up the sides. Each maxillary is armed with about twelve teeth, the middle of which are rather longer than the others. Light yellowish-bay above and behind, paler on the sides; a black streak across the extremity of the occipitals, extending downwards to the throat; three black lines radiate from the eye: one runs along the occipital margin to the black cross band; the second is oblique, running along the hinder margin of the seventh labial; the third is vertical, below the eye. On each side of the back a broad longitudinal black band, accompanied by a narrower one below; both gradually disappear towards the middle of the trunk. Lower parts uniform yellow; a series of black longitudinal streaks along the edges of the anterior third of the abdomen.

This fine species is peculiar to the western parts of India; it is found in Java and Sumatra, in the Malayan peninsula, on the coast of Tenasserim, in Assam and Cochinchina, and, finally, in the Khasya Mountains and Sikkim. It attains to a length of 6 feet, the tail being rather more than one-sixth; it not only inhabits bushes, but, at Pinang, it is also numerous in marshes and paddy-fields. It is equally nocturnal and diurnal, preying on rats, birds, lizards, and frogs. Cantor found in a female twenty-three eggs.

COMPSOSOMA MELANURUM.

Coluber melanurus, Schleg. *Phys. Serp.* ii. p. 141. pl. 5. figs. 11, 12; and *Abbild.* taf. 5.

Compsosoma melanurum, Dum. & Bibr. vii. p. 299.

Spilotes melanurus, Günth. *Colubr. Snakes*, p. 97.

Body and tail elongate, compressed; head flat, distinct from neck; snout rather long, obtusely rounded. Rostral shield broader than high; anterior frontals of moderate size, not quite half as large as posterior, subquadrangular, broader than long. Vertical five-sided, very broad in front, its anterior margin being rather longer than the lateral; lateral margins strongly convergent; hinder margins meeting at a right angle. Occipitals much longer than vertical, obliquely truncated behind; one preocular, large, and extending to the upper surface of the head, but not reaching the vertical; two postoculars, sometimes confluent into one. Nine low upper labials, the fourth, fifth, and sixth entering the orbit, the fourth with its hinder angle only; the sixth forms a part of the hinder margin of the orbit. Temporals 2+2: the two anterior are elongate, and the upper only is in contact with the postoculars; the hinder temporals vary in size and form. Scales rhombic, not elongate, rather strongly keeled, in nineteen rows. Ventrals 202-234; anal entire; subcaudals 80-107. The ventrals have no trace of a keel, and are bent up the sides. Each maxillary is armed with about twelve teeth, equal in size. Ground-colour of the anterior parts brownish, gradually passing into black posteriorly. A yellow vertebral band, broadly edged with black on both sides, commences behind the neck and is lost before it arrives in the middle of the trunk; a short black vertical streak below the eye; another descends from the hinder part of the orbit towards the angle of the mouth; a third, longer one commences in the temporal region and runs in an oblique direction to the edge of the belly, where it is continued as a series of about five large, distant black blotches. The lower parts uniform yellow, black posteriorly.

The markings described are found in some old individuals, whilst they are nearly entirely absent in others. On the other hand, young specimens always show them very bright, and more developed,—the series of black spots along the margins of the abdomen extending more backwards, being composed of twenty-three or more spots, each of which, moreover, has a white ocellus above.

This species is found in Sumatra, Java, Celebes, and other islands of the East Indian archipelago. We have seen two specimens, one of which is said to be from Bengal, the other from China. The former is 65 inches long, the tail measuring 14½ inches.

COMPSOSOMA RETICULARE. (Plate XXI. fig. D.)

Coluber reticularis, Cantor, *Proc. Zool. Soc.* 1839, p. 51.

Spilotes reticularis, Günth. *Colubr. Snakes*, p. 98.

Body and tail somewhat elongate and compressed; head flat, rather distinct from neck; snout long and broad, obtusely rounded in front. Rostral shield as high as broad; anterior frontals of moderate size, nearly half as large as posterior, broader than long. Vertical five-sided, broad in front, its anterior margin being as long as, or rather longer than, the posterior; lateral margins convergent; hinder margins meeting at a right angle. Occipitals rather longer than vertical, rounded behind. Loreal longer than high; one præocular, extending on to the upper surface of the head, but not reaching the vertical; sometimes a portion of the fourth labial is detached, forming a small lower præocular. Two postoculars, the upper sometimes united with the superciliary. Eight low upper labials, sometimes the two posterior united; the fourth, fifth, and sixth enter the orbit, or the fifth and sixth only, when there is a second præorbital, as mentioned above: the sixth is low, and does not ascend behind the hinder margin of the orbit. Temporals 2+3, the two anterior elongate, and in contact with the postoculars. Scales rhombic, not elongate, slightly keeled, in twenty-one (nineteen) rows. Ventrals 225-234; anal entire*; subcaudals 75-85. The ventrals have no trace of a keel, and are but little bent up the sides. Each maxillary is armed with seventeen teeth equal in size. Blackish brown; behind black, with numerous narrow whitish cross bands, on the anterior part of the body less conspicuous than on the posterior, where they generally assume a light brownish-red colour: the bands are sometimes indistinct and form only reticulated spots. Belly yellowish, spotted or marbled with black, sometimes uniform black. Some specimens show an indistinct pale longitudinal band along each side of the back.

In young specimens the whitish cross bands are very indistinct on the anterior part of the trunk, whilst brown spots disposed in four longitudinal series occupy this portion of the body; they are confluent towards the middle of the length and gradually disappear entirely. The abdominal spots are quadrangular.

In almost every specimen one or two pairs of cephalic shields are united, and the irregularities mentioned above are only a few of those which may occur; in this respect this species

* In a single specimen out of twenty, bifid.

shows its affinity to *C. melanurum*. It is numerous in different parts of the Himalayas—Nepal, Sikkim, Khasya; Cantor's specimens came from Chirra Punji. The largest specimen I have seen is 46 inches long, the tail measuring 9 inches.

We have given two views of the head, and one of a portion of the body, to show its coloration.

COMPSOSOMA HODGSONII.

Spilotes hodgsonii, Günth. *Proc. Zool. Soc.* 1860, p. 156. pl. 27.

Body and tail elongate, compressed; head flat, distinct from neck; snout rather long, obtusely rounded. Rostral shield as high as broad; anterior frontals of moderate size, half as large, or nearly half as large, as posterior, subquadrangular, broader than long. Vertical large, five-sided, pointed behind, its anterior margin being rather longer than the lateral; lateral margins strongly convergent. Occipitals much longer than vertical, obliquely truncated behind. Loreal longer than high, sometimes confluent with frontal; one large præocular, extending on to the upper surface of the head, but not reaching the vertical; two postoculars. Generally eight low upper labials, three of which enter the orbit; but sometimes two, and even three, are confluent into one shield; the fifth does not ascend to the hinder margin of the orbit. Temporals irregular in shape and number, but only one is in contact with the postoculars. Scales rhombic, not elongate, in twenty-three rows, those on the back with feeble keels. Ventrals 226–256; anal bifid; subcaudals 79–90. The ventrals have no trace of a keel, and are bent up the sides. Each maxillary is armed with sixteen or seventeen teeth, equal in size. Uniform brownish olive above; the skin between the scales and a part of the margin of the scales black. Lower parts uniform yellowish; the outer part of the margin of each ventral shield blackish.

This species appears to be rather scarce; we have received two specimens from Nepal through Mr. B. H. Hodgson, after whom the species is named, and one from Ladak, Tibet, stated to have been captured at an altitude of 15,200 feet. The latter specimen is 51 inches long, the tail measuring 11 inches.

CYNOPHIS, Gray.

Body rather slender and compressed; head narrow; tail one-fifth of the total length; trunk with more than 200 short ventral shields; eye of moderate size, with round pupil; nostril lateral, between two plates. Shields of the head regular; one præocular. Scales slightly keeled or with a pair of apical grooves, in from twenty-five to twenty-seven series. Anal entire. Teeth numerous in the jaws and on the palate, subequal in size.

Two species are known, which are found in Southern India and in Ceylon:—

Scales in twenty-seven rows	<i>C. helena</i> .
Scales in twenty-five rows	<i>C. malabaricus</i> .

CYNOPHIS HELENA.

- Russell, Ind. Serp.* i. tab. 32.
Coluber helena, *Daud. Rept.* vi. p. 277.
Herpetodryas helena, *Schleg. Phys. Serp.* ii. p. 192.
Cynophis bistrigatus, *Gray, Ann. & Mag. Nat. Hist.* 1849, iv. p. 246.
Plagiodon helena, *Dum. & Bibr.* vii. p. 170.
Cynophis helena, *Günth. Colubr. Snakes*, p. 95.

Body and tail slender, compressed; head narrow, flat, rather distinct from neck; snout long, obtusely rounded. Rostral rather broader than high; anterior frontals small, one-third or one-fourth the size of posterior, quadrangular, rather broader than long. Posterior frontals large, rather longer than broad. Vertical nearly twice as long as broad, pointed behind, with the lateral margins convergent. Occipitals elongate, obliquely truncated behind. Loreal somewhat longer than high; one præocular, extending to the upper surface of the head, and generally in contact with the vertical. Two postoculars. Nine low upper labials, the fifth and sixth, and sometimes the hinder angle of the fourth, coming into the orbit; sometimes the fourth is divided into two, the eye then being over the suture between the sixth and seventh. Temporals irregularly arranged, varying in size and number. Anterior chin-shield in contact with five or six lower labials. Scales on the back very slightly keeled, in twenty-seven series. Ventral shields 220–238; anal entire; subcaudals 85–94. Each maxillary is armed with twelve teeth, the middle of which are rather longer than the others. Reddish olive, with numerous more or less distinct, reticulated, black transverse bands across the anterior part of the back, each of which encloses two white ocelli on either side of the body, one above the other. On the posterior part of the body and on the tail the series of ocelli is replaced by a broad lateral brown band running to the tip of the tail. Neck with a pair of parallel longitudinal black bands above, and with an oblique black band on the side. A black line along the occipital suture; another oblique one from the eye, along the edge of the seventh labial. The ocellated lateral spots and the cross bands on the back are more distinct in the young than in the adult. Lower parts uniform white.

This species is not uncommon in Ceylon, but rarer in the Madras Presidency. The largest specimen I have observed measures 42 inches, the tail being 8 inches. It feeds on field mice and rats: a specimen figured in Mr. Elliott's collection of drawings was found in a rat-hole in a field at Martoor.

CYNOPHIS MALABARICUS. (Plate XXI. fig. A.)

Herpetodryas malabaricus, *Jerdon, Journ. As. Soc. Beng.* xxii. 1854, p. 530.

Body and tail of moderate length, rather compressed; head narrow, flat, not very distinct from neck; snout rather long, obtusely rounded. Rostral shield as high as broad; anterior frontals small, one-third the size of posterior, quadrangular, broader than long. Posterior frontals rather large, as long as broad. Vertical not twice as long as broad, five-sided, with the lateral margins convergent, and with a right angle behind. Occipitals rather longer than vertical, truncated behind. Loreal somewhat longer than high, irregularly quadrangular; one large præocular, extending on to the upper surface of the head, and sometimes touching the vertical. Two postoculars. Nine low upper labials, the fourth, fifth, and sixth coming into the orbit. Two elongate temporals are in contact with the postoculars; the hinder temporals are irregularly arranged, varying in size and number. Anterior chin-shield in contact with five lower labials. Scales smooth, with two apical grooves, in twenty-five series. Ventral shields 222-239; anal entire; subcaudals 91-95. Each maxillary is armed with fourteen teeth, the middle of which are rather longer than the others. Light brownish olive, with about twenty-two black cross bands, one-half or one-third as broad as the interspaces of the ground-colour between them; they disappear towards the end of the trunk, and each encloses six white ocelli, two on the back and two on each side; each band emits below two arched black lines crossing some of the ventral shields, one running to the band in front, the other to the band behind. The first band is modified into a white, black-edged collar. A broad brown band runs along the side of the tail and of the posterior part of the trunk. A short black vertical streak below the eye; another oblique streak from behind the eye, along the suture between the seventh and eighth labial shields.

This beautiful species is not very rare in Malabar; we received our specimens from the Anamallay Mountains, through Captain Beddome: the largest is 15 inches long, the tail measuring 3 inches; it had swallowed a mouse.

PTYAS.

*Ptyas**, *Fitzinger*.

Body elongate, more or less compressed; tail one-third or rather more than one-third of the total length; head distinct from neck; eye rather large; nostril lateral, between two plates. Shields of the head regular; two præoculars; two or three loreals. Scales smooth or feebly keeled, in fifteen or seventeen rows; ventrals without keel; anal bifid. Maxillary teeth gradually increasing in length posteriorly.

* I adopt this name, although unaccompanied by a proper diagnosis, in preference to that of *Coryphodon*, because the latter is preoccupied by a genus of fossil Mammalia (Owen, *Brit. Foss. Mamm.* 1844-46).

Two species are known:—

Scales in seventeen rows	<i>P. mucosus.</i>
Scales in fifteen rows	<i>P. korros.</i>

PTYAS MUCOSUS.

Coluber mucosus, *L. Mus. Ad. Fried.* t. 13. fig. 2, t. 23. fig. 2.

Russell, Ind. Serp. i. pl. 34; ii. pl. 18. f. 2 (young).

Coluber blumenbachii, *Merr. Tent.* p. 119. *Schleg. Phys. Serp.* ii. p. 137. pl. 5. figs. 7 & 8.

— *dhumna*, *Cantor, Proc. Zool. Soc.* 1839, p. 51.

Leptophis trifrenatus, *Hallowell, Proc. Acad. Nat. Sc. Philad.* 1860, p. 503.

Ptyas mucosus, *Cope, ibid.* p. 563.

Head rather broad and high, distinct from neck, with the snout not elongate; body and tail elongate, scarcely compressed; eye rather large. Rostral shield as high as broad; anterior frontals not quite half the size of posterior; vertical with the lateral margins convergent, concave, and longer than anterior; superciliary projecting; occipitals truncated behind. Three loreal shields, one above the two others; two preoculars: the upper large, concave, extending on to the upper side of the head, but not reaching the vertical; the lower is small. Two postoculars. Eight upper labials, the fourth and fifth entering the orbit; temporals elongate, 2+2, the anterior being in contact with the postoculars. Scales rhombic, in seventeen rows, those of the vertebral series rather larger than the others; they have a pair of apical grooves, and those on the back are generally keeled, but sometimes the keels are very faint, or appear to be entirely absent. Ventrals without any keel, very slightly bent up the sides, 196-208; anal bifid; subcaudals 118-134. Each maxillary is armed with from eighteen to twenty teeth, slightly increasing in strength posteriorly. Light brownish olive, scales with darker margins; the dark edges of the scales become broader and black on the posterior part of the trunk and on the tail, giving a reticulated appearance to these parts. Young and half-grown specimens show dark irregular transverse streaks. Shields of the head with blackish margins.

The Indian Rat-snake is one of the most common species on the continent and in Ceylon, and appears to occur everywhere; it is scarce in the archipelago, as its occurrence has been recorded in Java only; on the other hand, it is not rare in Chusan and Formosa. In the Himalayas it ascends to only 5240 feet above the level of the sea. It is a powerful snake, attaining to a length of 7 feet, the tail being one-third or rather more. Its food consists of mammals, birds, and frogs; it frequently enters the dwellings of man in search of mice, rats, and young fowls. It is of fierce habits, always ready to bite, and old examples brought to Europe never become tame. Cantor says that it utters, when irritated, a peculiar diminuendo sound, not unlike that produced by a gently struck tuning-fork.

PTYAS KORROS. (Figure, p. 164.)

Coluber korros (Reine.), *Schleg. Phys. Serp.* ii. p. 139, and *Abbild.* p. 99. pl. 27, & pl. 28. figs. 1-6.
Cantor, Mal. Rept. p. 74.

Ptyas korros, *Cope, Proc. Acad. Nat. Sc. Philad.* 1860, p. 563.

Head rather narrow, with the snout of moderate length; body and tail elongate, scarcely compressed; eye large. Rostral shield as high as broad; anterior frontals half as large as posterior; vertical with the lateral margins convergent, concave, and longer than anterior; superciliary projecting; occipitals obliquely truncated behind. Generally two loreal shields, one behind the other; two præoculars: the upper large, concave, extending on to the upper side of the head, but not reaching the vertical; the lower is small, and evidently a detached portion of the third upper labial; two postoculars. Eight upper labials, the fourth and fifth entering the orbit; temporals elongate, 2+2, the anterior being in contact with the postoculars. Scales rather elongate, in fifteen rows, those of the vertebral series not larger; they have a pair of apical grooves, and are smooth, but those on the hinder part of the back have an indistinct keel. Ventrals without keel, somewhat bent up the sides, 162-176; anal bifid; subcaudals 97-136. Each maxillary is armed with about twenty teeth, slightly increasing in strength posteriorly. Light or dark brownish-green above, the scales with a darker margin; those on the hinder part of the trunk and on the tail are edged with black, the edges producing a regular network. Lower parts uniform yellowish.

This species is very closely allied to *Pt. mucosus*; and, sometimes, it is difficult to decide to which species examples should be referred. *Pt. mucosus* generally has the scales more strongly keeled, a triple loreal, seventeen rows of scales, black-edged shields of the head, and about 200 ventrals: yet a specimen from Hongkong with three loreals, fifteen rows of scales, and 166 ventrals appears to belong to that species, and not to *Pt. korros*. Another specimen from Ceylon which we refer also to *Pt. mucosus* has only one loreal.

Pt. korros has a more limited range than *Pt. mucosus*; it is found in Java and Sumatra, Siam, the Malayan peninsula, Arakan, Tenasserim, and Southern China. Its habits are similar to those of *Pt. mucosus*; but we have never seen a specimen more than 69 inches long, the tail measuring 24 inches.

XENELAPHIS, *Gthr.*

Body elongate, not compressed; tail more than one-third of the total length; head rather short; eye of moderate size, with round pupil; nostril lateral, between two plates. Shields of the head regular; two præoculars; one loreal. Scales smooth, without apical groove, in seventeen rows, those

of the vertebral series enlarged, six-sided; ventrals not keeled; anal bifid. Jaws with numerous teeth subequal in size.

Only one species is known.

XENELAPHIS HEXAHONOTUS. (Plate XXI. fig. C.)

Coluber hexahonotus, Cantor, *Mal. Rept.* p. 74.

Coryphodon hexahonotus, Günth. *Colubr. Snakes*, p. 110.

Head short, truncated in front, rather distinct from neck; body and tail elongate, not compressed; eye of moderate size. Rostral broader than high; anterior frontals as long as broad, more than half as large as posterior; vertical five-sided, with the anterior margin longer than the lateral margins, which are somewhat convergent, and with a right angle behind; occipitals angular behind. Loreal quadrangular, rather longer than high, entering with its hinder angle between the two præorbitals; the upper præorbital is larger than the lower, extending on to the upper surface of the head, but not reaching the vertical. Three postoculars, the lower being as large as the two others; it forms a part of the lower orbital margin. Eight upper labials, the fourth of which enters the orbit; the fifth is small, about as large as the first, situated below the lower postorbital. Temporals elongate, 2+2, the two anterior in contact with the postoculars. Scales rhombic, with truncated apex, smooth, without apical groove, in seventeen rows; those of the vertebral series are rather larger than the others and hexagonal. Ventrals 191-197, extending very little up the sides; anal bifid; subcaudals 148-179. Each maxillary is armed with a continuous series of twenty-two closely-set teeth, which gradually become somewhat longer and stronger behind. Brown, with black cross bands in immature specimens; these bands are as broad as the interspaces of the ground-colour, and occupy only the anterior half of the length of the trunk; they become indistinct with age: old examples are uniform brown above, with traces of some of the bands left on the sides of the anterior part of the trunk. Lower parts uniform yellowish.

This species is scarce; it is found in Arakan, Pinang, and Singapore: the British Museum has received an example from Borneo. It attains to a length of 62 inches, the tail measuring 25 inches, the head only $1\frac{1}{2}$ inch.

We have given an upper and lateral view of the head, and one of a portion of the trunk, to show the form of the scales of the vertebral series: all of the natural size.

ZAMENIS, *Wagler*.

Body and tail elongate; trunk with 200 or more ventral shields; head distinct from neck, flat; eye of moderate size, with round pupil; nostril lateral, between two plates. The shields of the head have a tendency to divide in two or more pieces; loreal present; generally two anterior and two posterior oculars; eye sometimes surrounded by separate pieces of the upper labials. Scales smooth or slightly keeled; ventrals rounded or with a very indistinct lateral keel; anal bifid; subcaudals two-rowed. Teeth numerous in the jaws and on the palate; the last maxillary tooth is generally the largest, and separated from the others by a short interspace.

This genus of Colubrine snakes is confined to the countries round the shores of the Mediterranean, extending eastwards through South-western Asia to the peninsula of Southern India; it is distinguished from the other Colubri by its dentition, which character, however, becomes rather indefinite in *Z. diadema* and also in *Z. fasciolatus*; the British Museum possesses an example of the former and two of the latter in which the dentition is coryphodont or even isodont.

The following species occur in British India:—

- A ring of small separate shields round the orbit; a transverse series of small shields between posterior frontals and vertical *Z. diadema*, p. 252.
 Scales in nineteen rows; occipitals truncated behind, each with a small semi-circular shield behind *Z. ventrimaculatus*, p. 253.
 Scales in twenty-one rows; a series of large round brown spots along the anterior half of the back *Z. gracilis*, p. 254.
 Scales in twenty-one or twenty-three rows; narrow white, brown, or black variegated cross bands on the anterior part of the back *Z. fasciolatus*, p. 254.

ZAMENIS DIADEMA. (Plate XXI. fig. G.)

Russell, ii. p. 34. pl. 30.

Coluber diadema, *Schleg. Phys. Serp.* ii. p. 148 (not *Blyth*).

Closely allied to *Z. cliffordii*. Head rather elongate, broader behind, very distinct from neck. Body and tail rather slender, compressed. Eye of moderate size. Rostral shield as high as broad. Anterior frontals rather larger than posterior, which are separated from the vertical by a transverse series of four small shields. Vertical large, five-sided; occipitals

obliquely truncated behind. Loreals three or four. One preocular, large, extending to, or nearly to, the vertical; a ring of small shields surrounds the lower and hinder parts of the orbit. Upper labials small, about fourteen; temporals numerous, scale-like. Scales oblong-ovate, keeled, in twenty-nine series. Ventrals 237; anal entire; subcaudals 110. There is a very distinct ridge along each side of the abdomen. Each maxillary is armed with about twelve teeth subequal in size; the last tooth is in a continuous series with the others, and scarcely larger than the preceding; in one specimen it is quite equal in size to the others. Ground-colour yellowish olive, with a dorsal series of round brown spots; two series of short brown longitudinal streaks run along each side of the body. Each shield on the snout with a brown spot; a brown band crosses the interorbital space and is continued to the angle of the mouth; a similar horseshoe-like band on the occipitals.

This species is the eastern representative of *Z. cliffordii*, from which it differs only in the small shields behind the frontals, and in the keeled ventral shields. The feeble development of the posterior maxillary tooth is very remarkable—so much so, that its dentition would be pronounced equal by every one who was not aware of its affinity to *Z. cliffordii*. It is found in Afghanistan and in Sindh (Kurrachee). Russell's specimen was from Bombay. One of the specimens in the British Museum is 36 inches long, the tail measuring 8 inches; but I have seen an example which must have been at least 5 feet long.

The upper and lateral views of the head, given on Plate XXI., are of the natural size.

ZAMENIS VENTRIMACULATUS.

Coluber ventrimaculatus, Gray, *Ind. Zool. c. fig.*

—diadema, Blyth, *Journ. As. Soc. Beng.* xxiii. (1855) p. 291 (not Schleg.).

Zamenis ventrimaculatus, var. A, Günth. *Colubr. Snakes*, p. 106.

Head of moderate length, distinct from neck; body and tail slender; eye of moderate size. Rostral shield as high as broad; anterior frontals nearly as large as posterior, as long as broad. Vertical five-sided, broad in front, with the lateral margins very concave; occipitals truncated behind, each with a small semicircular shield behind. Loreal quadrangular, nearly as high as long; two preoculars; the lower is small; the upper concave, extending on to the vertical shield; two postoculars. Nine upper labials, the fifth and sixth of which enter the orbit. Temporals rather irregular; two are in contact with the postoculars, the lower of them being larger than the upper. Scales oblong-ovate, smooth, without apical groove, in nineteen rows. Ventrals 205–220; anal bifid; subcaudals 90–102. Abdomen with a slight ridge on each side. Each maxillary is armed with twelve teeth, the last of which is longer than the others, and somewhat remote from the preceding. Yellowish olive, with numerous very distinct narrow black cross bars on the back, each being half as wide as an interspace of the ground-colour; a series of small black spots along each side; belly yellowish, with an irregular series of black dots along each side. A black cross band between the eyes, an oblique black streak below them, another oblique streak on the temple, a blackish spot in the loreal region, and, finally, a black streak along the median line of the neck.

The coloration here described is peculiar to the Indian variety of a species which extends throughout the whole of South-western Asia to Egypt, and the Egyptian variety of which is known by different names—*Z. florulentus*, &c. The typical specimens of *Z. ventrimaculatus* are said to be from Bengal, but it is more probable that they came from the western parts of the Indian region. A specimen which we received from Mesopotamia agrees completely with the types: the largest of the latter is a mature female, 35 inches long, the tail measuring 9 inches; but we have seen examples which were about 4 feet long.

ZAMENIS GRACILIS. (Plate XXI. fig. II.)

Zamenis gracilis, Günth. *Ann. & Mag. Nat. Hist.* 1862, February, p. 125.

Head rather narrow, distinct from neck; body and tail slender, scarcely compressed; eye of moderate size. Rostral shield as high as broad; anterior frontals half as large as posterior, broader than long. Vertical five-sided, broad in front, with the lateral margins concave. Occipitals rounded behind. Loreal square; two præoculars: the upper is in contact with the vertical; the lower small—apparently a separate portion of the fourth labial. Two postoculars. Upper labials nine, the fifth and sixth coming into the orbit. Temporals 2+2+3+3, the two anterior in contact with the postoculars. Scales elongate, narrow, smooth, in twenty-one rows—some with a pair of very indistinct apical grooves. Ventrals 219; anal bifid; subcaudals 120. Abdomen with a slight ridge on each side. Each maxillary is armed with twelve teeth, the last of which is longer than the others, and somewhat remote from the preceding. Yellowish olive, with a single series of large round brown spots edged with black, along the anterior half of the trunk; the spots become indistinct posteriorly, and only the black edges continue, forming cross bars on the back, but merely spots on the tail. A blackish streak across the snout; crown of the head with two brown, black-edged cross bands, the anterior between and below the eyes; the posterior across the occipitals, forming an acute angle on the vertical. The first brown nuchal spot is produced forward within the limbs of the occipital cross band. An irregular series of black spots on each side of the belly, which is uniform yellow.

This species is found in the Dekkan and in Sindh; it attains to a length of 33 inches, the tail measuring 10 inches.

ZAMENIS FASCIOLATUS. (Plate XXI. fig. F.)

Russell, Ind. Serp. i. pl. 21.

Coleuber fasciolatus, Shaw, *Zool.* iii. p. 528. *Cantor, Mal. Rept.* p. 72.

— *hebe*, Daud. *Rept.* vi. p. 385.

— *curvirostris*, Cantor, *Proc. Zool. Soc.* 1839, p. 51.

Coryphodon fasciolatus, Günth., *Coleubr. Snakes*, p. 109.

Tyria fasciolata, Cope, *Proc. Acad. Nat. Sc. Philad.* 1862, p. 388.

Head of moderate length and width, rather distinct from neck; body and tail somewhat

slender, not compressed; eye of moderate size. Rostral shield broader than high, swollen and protruding (more so in adult examples than in young ones). Anterior frontals more than half as large as posterior, as long as broad. Vertical large, very broad in front, with the lateral margins much convergent and concave; its anterior margin is longer than the posterior. Occipitals subtruncated behind. Loreal square; a large præorbital is in contact with the vertical; generally a small piece is detached from the third upper labial shield, forming a second lower præorbital; two postorbitals. Eight upper labials, the fourth and fifth entering the orbit; the fifth is the highest, ascending a short way up behind the orbit. Temporals 2 + 2 or 2 + 3, the lower anterior the largest; both anterior in contact with the postoculars. Scales elongate, narrow, smooth, with a pair of apical grooves, in twenty-one or twenty-three rows. Ventrals 201-229, somewhat ascending up the sides, without any keel; anal bifid; subcaudals 73-87. Each maxillary is armed with about fourteen teeth, slightly increasing in length posteriorly, the last being rather stronger, but scarcely longer, than the preceding, separated from it by a short interval. Yellowish or brownish olive above, with narrow, equidistant, white, brown, and black variegated cross bands; they occupy only the anterior half or third of the body, extending more backwards in young individuals than in old ones, in which they may entirely disappear; lower parts uniform yellowish.

This species is not uncommon in the peninsula of Southern India; it appears to be scarce in Bengal; a single specimen (which I have also examined) was found in the Province Wellesley by Dr. Cantor. It attains to a length of 41 inches, the tail measuring 9 inches.

The upper and lateral views of the head, given on Plate XXI., are of the natural size.

ZAOCYS, Cope.

Body elongate and compressed; ventral shields about 200; tail elongate, its length being one-fourth or more than one-fourth of the total. Head distinct from neck, of moderate length, rather elevated; eye large, with round pupil. Shields of the head regular; superciliaries large, convex; two præoculars, the upper of which is large, not reaching the vertical, the lower small; two postoculars. Scales in fourteen or sixteen rows, those of the median series generally keeled. Anal bifid. Teeth in the jaws subequal in size; those of the maxillaries in a continuous series, rather larger behind.

This genus has been formed for several species, found on the Indian continent and in Borneo, which approach the Tree Snakes by the character of their elongate body; their ground-colour is generally green. Having examined numerous examples, I now distinguish

three species among the specimens formerly included under the name of *Coryphodon carinatus*†, retaining this name for the Bornean form.

Four species are known, two of which occur in British India:—

* <i>Three loreals</i> : <i>ZAPYRUS</i> .	
Median scales smooth	<i>Z. fuscus</i> †.
Two median rows of scales keeled	<i>Z. carinatus</i> ‡.
** <i>One loreal</i> : <i>ZAOCTS</i> .	
Two median rows of scales keeled	<i>Z. dhumnades</i> .
Four median rows of scales keeled	<i>Z. nigromarginatus</i> .

ZAOCTS DHUMNADES. (Plate XXII. fig. A.)

Coluber dhumnades, Cantor, *Ann. & Mag. Nat. Hist.* 1842, ix. p. 483, and *Mal. Rept.* p. 74.

Ablabes vittatus, Dum. & Bibr. vii. p. 326‡.

Coryphodon carinatus, var., Günth. *Colubr. Snakes*, p. 112.

Zaoctys dhumnades, Cope, *Proc. Acad. Nat. Sc. Philad.* 1860, p. 563.

Occipitals obliquely truncated behind; loreal simple, rather longer than high; eight upper labials, the fourth and fifth entering the orbit; temporals 2+2, the two anterior in contact with the oculars. Scales rhombic, not elongate, in sixteen (fourteen) rows, those of the two middle series strongly keeled, the others with two apical grooves. Ventrals 189–199; anal bifid; subcaudals 92–98. Each maxillary is armed with thirteen teeth, the anterior of which are smallest, the middle and posterior equal in size. Greenish anteriorly, each scale with a black margin; a yellow band, broadly edged with black, runs along the median line of the front part of the trunk; an indistinct blackish band on each side of the body, along the third outer series of scales. Tail and posterior half of the trunk entirely black.

This species does not appear to be confined to the Chinese island of Chusan, Cope mentioning its occurrence at Ningpo. Our longest specimen measures 70 inches, the tail being 20 inches.

We have given a lateral view of the head, and one of a portion of the trunk, to show the carination of the dorsal scales.

† From Borneo: see *Colubr. Snakes*, p. 112.

‡ *ZAOCTS CARINATUS* (*Coryphodon carinatus*, spec. a, Günth. *Colubr. Snakes*, p. 112).—Occipitals truncated behind; loreal triple; nine upper labials, the fifth and sixth entering the orbit; temporals 2+2, the two anterior in contact with the oculars. Scales rhombic, not elongate, in sixteen rows, those of the two middle series keeled; the others with two apical grooves. Ventrals 209; anal bifid; subcaudals ca. 110. Each maxillary is armed with about twenty teeth, which gradually become stronger and longer posteriorly. Brownish olive anteriorly, with reticulated white cross bands; tail and posterior third of the trunk black, with two series of pure white spots on each side, ovate on the trunk and circular on the tail; belly and lower part of the tail with series of round white spots.—Borneo. Our largest example is nearly 10 feet long, the tail being one-fourth.

§ The specimen on which *A. vittatus*, D. & B., has been founded has sixteen series of scales.

ZAOCTS NIGROMARGINATUS. (Plate XXII. fig. B.)

Coluber nigromarginatus, *Blyth, Journ. As. Soc. Beng.* xxiii. p. 290.

Coryphodon carinatus, var., *Günth. Colubr. Snakes*, p. 113, and *Proc. Zool. Soc.* 1860, p. 167.

Occipitals obliquely truncated behind; loreal simple, rather longer than high; eight upper labials, the fourth and fifth entering the orbit; temporals 2+2, the two anterior in contact with the oculars. Scales elongate, acutely pointed, in sixteen rows, those of the four middle series keeled; the others with two apical grooves. Ventrals 193; anal bifid; subcaudals 126-134. Each maxillary is armed with from eighteen to twenty teeth, which gradually become somewhat stronger posteriorly. Green, paler below; two broad deep-black bands along each side of the tail, advancing forwards on the trunk to its middle third in adult specimens, and nearly to the head in young ones; the two upper bands are separated from each other by the joining halves of the two vertebral series.

We have received this species from Nepal, Sikkim, and Khasya; it belongs to the fauna of the temperate zone of the Himalayas, reaching an altitude of 7100 feet above the sea; our largest specimen is 8 feet long, the tail measuring 27 inches.

We have given a lateral view of the head, and one of a portion of the trunk, to show the carination of the dorsal scales.

HERPETOREAS, *Gthr.*

Body and tail slender, compressed; trunk with more than 200 ventral shields; head somewhat elongate, rounded in front, flat above; eye of moderate size, with round pupil; nostril lateral, between two shields. Shields of the head regular: loreal present; one anterior, two posterior oculars. Scales moderately elongate, slightly keeled, in nineteen rows; ventrals strongly bent up the sides; anal bifid. The posterior maxillary tooth is the longest, in a continuous series with the anterior ones.

Only one species is known.

HERPETOREAS SIEBOLDII.

Herpetoreas sieboldii, *Günth. Proc. Zool. Soc.* 1860, p. 156.

The rostral shield is broader than high, and rounded superiorly; the anterior frontals are pentagonal, one-half the size of the posterior, which are bent downwards on the side of the

head. The vertical is pentagonal, much broader than the superciliary, and not quite twice as long as broad; its lateral margins are nearly parallel; the posterior ones very short, and meeting at a right angle. The occipitals are slightly elongate and rather narrow, subtruncated posteriorly. Nostril between two plates; one loreal, one anterior, and two posterior oculars; eight upper labials, the third, fourth, and fifth of which enter the orbit. There appear to be five temporal shields. Ten lower labials, those of the first pair being in contact with each other, behind the median shield, which has the posterior margin obtusely rounded. Two pairs of chin-shields, the anterior being the smaller. The trunk is compressed, especially towards the tail, and slender; it is surrounded by nineteen series of scales, those of the back being slightly keeled; they are rather elongate, and assume a rhombic form towards the tail. The ventral and subcaudal plates are bent upwards to the sides, but not keeled. Ventrals 216; anal bifid; caudals 90.

The two posterior teeth are twice as long as the anterior, with which they form a continuous series; they are not grooved. The upper parts are uniform greenish brown, the lower parts yellowish; the ventrals have an elongate spot on each side.

The single specimen I have seen has the head injured; it was procured by Messrs. von Schlagintweit in Sikkim, at 7500 feet above the level of the sea. Total length 3 feet 1 inch; length of the head 10 lines, of the tail 9 inches.

Coluber prasinus (Blyth, Journ. As. Soc. Beng. xxiii. p. 291), from Assam and Tenasserim, is perhaps the same snake; but it would be hazardous to name a species from so insufficient a diagnosis as that quoted.

TROPIDONOTUS, Kuhl.

Body cylindrical; head distinct from neck, flat, cleft of the mouth wide; eye of moderate size, or rather large, with round pupil; nostril lateral, between two plates. Shields of the head regular; loreal always present. Scales keeled; ventrals rounded, considerably less than 200 in number; anal bifid; subcaudals two-rowed. Teeth numerous in the jaws and on the palate: the anterior in the jaws are always shortest; the posterior lengthened, but not grooved.

The typical *Tropidonoti* are easily recognized by their stoutish, cylindrical body, keeled scales, flat head covered with very regular shields, wide cleft of the mouth, and numerous teeth, the strongest of which are at the hinder end of the maxillary bone. They frequent the neighbourhood of fresh waters, and feed on aquatic animals—frogs, toads, and fishes. They do not overpower or kill their prey by throwing a coil of the body round it, but,

having seized it, they at once commence to swallow it. They are excellent swimmers, but more frequently live near water than in it; in agreement with which habit, the position of their nostrils is not on the upper surface of the head, as in the true freshwater snakes, but on the side.

However, this type of snakes passes into other groups: whilst the species with a stout body approach the *Homalopsides*, others, of a more slender make, show a transition to an aberrant species, *Tropidonotus platyceps*, which at first sight might be taken for a *Herpetodryas*, having a remarkably slender body and very feeble keels of the scales; the ventrals, however, are rounded, without any trace of a keel.

The *Tropidonoti* are found in North America, Europe, Asia, the East Indian archipelago, and North-western Australia: a single species has lately been received from tropical Africa. The species are very numerous, and some of them extremely rich in individuals. The following occur in British India:—

I. *The teeth form one continuous series, gradually increasing in length, the last tooth being not much larger than the preceding.*

Each ventral with blackish anterior margin; two labials entering the orbit

T. quincunciatus, p. 260.

Belly with black cross bands

T. annularis, p. 261.

Three labial shields entering the orbit

T. trianguligerus, p. 261.

II. *The last tooth is much larger than the one preceding, and enveloped in a separate membranaceous pouch: TROPIDONOTUS.*

A. *The last tooth is scarcely separated from the others by an interval.*

Scales in nineteen rows; subcaudals ca. 78; eye large; anterior part of the belly with large quadrangular blackish-brown spots

T. macrophthalmus, p. 262.

Scales in seventeen rows; subcaudals ca. 52; eye large; anterior part of the belly with subquadrangular blackish-brown spots

T. dorsalis, p. 263.

(*) Scales in seventeen rows; subcaudals 124-146; eye large.

T. macrops, p. 263.

B. *The last tooth is separated from the others by a distinct interval: AMPHISMA, D. & B.*

Scales in nineteen rows; one (two) pre-, two post-oculars. Rostral shield with a black vertical streak

T. platyceps, p. 264.

Scales in nineteen rows; one preocular; the third, fourth, and fifth labials enter the orbit; an oblique triangular black spot below the eye; no dorsal bands

T. subminiatus, p. 265.

Scales in nineteen rows; one preocular; the fourth and fifth labials enter the orbit. Upper labials edged with black behind; two dorsal series of small yellow spots

T. himalayensis, p. 265.

(*) Scales in seventeen rows; 2-4 pre-, 4-5 post-oculars

T. angusticeps, p. 266.

Scales in nineteen rows; anterior frontals pointed in front; back with black transverse bands and with two yellowish longitudinal bands

T. stolatus, p. 266.

Scales in nineteen rows; anterior frontals truncated in front. Body with black cross bands, each divided into three square spots

T. monticola, p. 267.

Scales in nineteen rows; one preocular; nine upper labials, the fourth, fifth, and sixth entering the orbit; a V-like yellow marking on the neck

T. juncus, p. 268.

* The species marked (*) were not examined by myself.

- Scales in nineteen rows; two præoculars; a series of white ocelli along each side of the back; a black band on the side of head and neck. *T. ceylonensis*, p. 268.
- Scales in nineteen rows; one præocular, three postoculars; the fourth, fifth, and sixth labials enter the orbit; temporals 1+2 *T. beddomii*, p. 269.
- (*) Scales in seventeen rows; ventrals 160; the penultimate and antepenultimate upper labials very large. *T. nigrocinctus*, p. 269.
- (*) Scales in seventeen rows; ventrals ca. 128; upper labials 8, the eye resting on the third and fourth *T. flavipunctatus*, p. 270.
- (*) Scales in fifteen rows. *T. zebrius*, p. 270.
- Scales in nineteen rows; two præ-, four (three) post-oculars; an oblique black spot on each side of the neck *T. tigrinus*, p. 271.
- Scales in nineteen rows. Black, with narrow white rings. *T. leucomelas*, p. 271.
- Scales in (twenty-three), twenty-five, (twenty-seven) rows. *T. plumbicolor*, p. 272.

TROPIDONOTUS QUINCUNCILIATUS.

- Russell, Ind. Serp.* i. pl. 20 (had), pl. 28 (had), pl. 33; ii. pl. 3. fig. 1 (young), & pls. 14, 15 a (young).
Hydrus piscator et palustris, Schneid. Amph. pp. 247, 249.
Coluber anastomosatus, braminus, et umbratus, Daud. Rept. pp. 140, 144, & 176.
 — *rectangulus, Gray, Ind. Zool.*
 — *hippus, Reuss, Mus. Senckenb.* i. p. 150. pl. 9. fig. 2.
Tropidonotus quincunciatus et umbratus, Schleg. Phys. Serp. ii. pp. 307, 309. pl. 12. figs. 4, 5.
 — *umbratus, Cantor, Mal. Rept.* p. 89.
 — *quincunciatus, Dum. & Bibr. vii.* p. 592. *Günth. Colubr. Saakes*, p. 64.

Head and tail of moderate length, body rather stout; eye rather small. Scales in nineteen rows. Ventrals 129–146; subcaudals 64–80. Anterior frontals pointed in front. One præocular, just reaching to the upper surface of the crown; three (exceptionally four) postoculars. Loreal large, square. Nine upper labials, the fourth and fifth entering the orbit, the seventh and eighth being the largest. Temporals 2+2*. Each maxillary is armed with eighteen teeth, which are small anteriorly but gradually increase in size posteriorly, the last standing in a continuous series with the others, and being but little larger than the preceding.

The coloration varies exceedingly; but there are generally two oblique black streaks behind the eye: the upper crosses the temporal plates and the eighth labial; the lower the inferior postorbital, running along the suture of the sixth and seventh labials. These streaks are absent only in a dark variety from Nepal. The belly is white, each ventral having a more or less distinct blackish anterior margin. The ground-colour of the upper parts is generally greyish or brownish olive.

Var. α . Square black spots are arranged quincuncially in three, five, six, or seven series; when they are large they form fewer series than when they are small; during life the sides are ornamented with a series of scarlet spots, separated from each other by black cross bars. Specimens with this coloration are found in almost every part of India.

* In one example only, from Gamboja, I found a single anterior temporal shield.

Var. β . The spots are, as it were, dissolved into a network of black lines, with intermixed white dots. Specimens of this variety are as frequent as of var. α .

Var. γ . The spots are confluent, forming broad, rhombic, transverse blackish or brownish bands, each with a darker margin; the anterior of these bands are sometimes again confluent, forming a zigzag band. We have received this variety from Ceylon only.

Var. δ . Upper parts nearly entirely uniform blackish ash-coloured; only a few scales have a black or white dot at the base. The temple-streaks are very inconspicuous or entirely absent. This variety is very common in Nepal and in Ceylon, individuals from the latter country having strongly keeled scales.

This is one of the most widely spread species of the East Indies, ranging from Mesopotamia into the southern parts of China, and inhabiting most of the islands of the western half of the Archipelago. It abounds near rivers and pools, feeding on frogs and fishes; it attains to a length of 3 feet, and is of fierce habits.

TROPIDONOTUS ANNULARIS.

Tropidonotus annularis, Hallowell, *Proc. Acad. Nat. Sc. Philad.* 1856, p. 151. Günth. *Columb. Snakes*, p. 67.

— *chinensis*, (Jan) Berthold, *Gött. Nachr.* 1859, p. 180.

Head, body, and tail of moderate length; eye rather small. Scales in nineteen rows. Ventrals 158; subcaudals 54. Anterior frontals pointed in front, as long as posterior. Occipitals narrow, elongate. One preocular, just reaching to the upper surface of the crown; three postoculars. Loreal quadrangular. Eight (nine) upper labials, only the fourth (fifth) entering the orbit. Temporals 3+3; two of the anterior temporals are in contact with the postoculars. Each maxillary is armed with eighteen teeth, the posterior being scarcely larger than those in the middle, and all forming one continuous series. Back uniform lead-coloured; belly red (white in spirits), with black cross bands, each occupying one or two ventral or subcaudal shields, frequently interrupted in the middle, and extending upwards on the sides of the body, where they form a series of about forty vertical bars; each of these bars generally encloses several white dots.

This species is found in China (Ningpo, Chikiang) and on the island of Formosa; it attains to a length of more than 30 inches.

TROPIDONOTUS TRIANGULIGERUS.

Tropidonotus trianguligerus, (Reinw.) Boie, *Iris*, 1827, p. 535. Schleg. *Phys. Serp.* ii. p. 311. pl. 12. figs. 1-3.

Head, body, and tail of moderate length; eye of moderate size. Scales in nineteen rows; ventrals (140-)148; subcaudals 70-90. Anterior frontals triangular, somewhat truncated in

front, longer than broad, and at least as long as posterior; occipitals of moderate length, rounded behind. One præocular, reaching to the upper surface of the crown; three postoculars. Loreal quadrangular, as high as long. Nine upper labials, the fourth, fifth, and sixth of which enter the orbit. Temporals 2+2, the two anterior being in contact with the postoculars. Each maxillary is armed with about twenty-one closely-set teeth, the posterior being but little larger than those in the middle, and all forming one continuous series. Upper parts uniform blackish brown, sides lighter, and on the anterior part of the body yellowish (probably red during life); a series of large triangular black spots, with the points resting upon the ventral shields, runs along each side of the trunk and tail; belly uniform whitish, some ventral shields with a blackish posterior margin; all the upper labial shields have either a black posterior margin or, at least, a black spot.

This species is found in Java, Sumatra, and Borneo; we have also received a specimen which is undoubtedly from Pinang. It attains to a length of about 30 inches.

TROPIDONOTUS MACROPHthalmus. (Plate XXII. fig. C.)

Xenodon macrophthalmus, Günth. *Cat. Snakes*, p. 58.

Head, trunk, and tail of moderate length; eye large. Scales in nineteen rows, much imbricate, those on the neck and anterior part of the trunk disposed in transverse rows as in *Naja*. Ventrals 162-165; subcaudals 78. Anterior frontals obtusely rounded in front. One præocular, just reaching to the upper surface of the crown; three postoculars. Loreal large, quadrangular, as high as long; eight upper labials, the fourth and fifth entering the orbit, the seventh the largest. Temporals rather irregular, two being in contact with the postoculars. Each maxillary is armed with twenty small teeth, the last being much larger than the preceding, from which it is not separated by an interspace*. Brown or blackish brown above, uniform or with a dorsal series of reddish-brown spots; neck with an indistinct arrow-shaped mark. Anterior part of the belly with large quadrangular blackish-brown spots, posterior part and lower side of the tail more or less clouded with brown.

Young specimens have indistinct square dark spots on the back, arranged in quincunx, and a bright-yellow collar broadly edged with black.

This species may be at once distinguished by its large eye and by its dilatable neck, the scales of which show an arrangement very similar to that of a Cobra, for which it is frequently taken. All the specimens I have seen show unmistakeable signs that their captors considered it best to kill them from a distance, and to inflict a death-wound as near to the head as possible. It is a Himalayan species, being found in Khasya and Sikkim—in the latter country at an elevation of 4000 feet. It attains to a length of 39 inches, the tail measuring 7 inches.

* In the specimen of which I formerly examined the dentition, two of the small hinder teeth are lost, so that a toothless interspace appears to exist in front of the last tooth.

I thought for some time that *Tropidonotus macrops*, Blyth (Journ. As. Soc. Beng. xxiii. 1855, p. 296), might be identical with the above species; but, on further consideration, this does not appear to be probable, on account of the great difference in the number of subcaudal shields.

We have given an entire figure of this species, of the natural size.

TROPIDONOTUS DORSALIS.

Xenodon macrophthalmus, spec. f. Günth. *Cobulr. Snakes*, p. 58.

Head, trunk, and tail of moderate length; eye large. Scales in seventeen rows, much imbricate, those on the neck and anterior part of the trunk disposed in very oblique rows. Ventrals 143; subcaudals 52. Anterior frontals obtusely rounded in front, more than half as large as posterior. Vertical five-sided, with the lateral margins longest and convergent, and with an obtuse hinder angle. Occipitals not twice as large as vertical. One præocular, just reaching to the upper surface of the crown; three postoculars (two of which are confluent into one on one side of the specimen). Loreal subtriangular, higher than long; eight upper labials, the fourth and fifth entering the orbit, the seventh the largest. Temporals rather irregular, two being in contact with the postoculars. Two pairs of chin-shields, the posterior of which are divergent behind, and rather longer than the anterior, which are in contact with four labials. Each maxillary is armed with twenty small teeth, the last being much larger than the preceding, from which it is scarcely separated by an interspace. Brownish grey, with a vertebral series of about twenty-five rhombic reddish spots, each occupying about four scales; the spots are confluent posteriorly, and continued on the tail as a reddish, black-edged band. An ill-defined blackish band runs along the edge of the ventral shields. Belly with subquadrangular blackish spots anteriorly, and punctulated with brown posteriorly; an indistinct arrow-shaped blotch on the crown of the head, separated by a reddish streak from a black band running from the eye to the angle of the mouth. Upper labials with a narrow black hinder edge.

This species is very closely allied to *T. macrophthalmus*; its neck appears to be less dilatable, although it has a similar arrangement of the scales. The only specimen I have seen is from Chikiang; it is $24\frac{1}{2}$ inches long, the tail measuring $4\frac{1}{2}$ inches.

Not having seen the following species, I can only say that *probably* it has the same dentition as *T. macrophthalmus* and *dorsalis*, to which it appears to be closely allied.

TROPIDONOTUS MACROPS.

Tropidonotus macrops, Blyth, *Journ. As. Soc. Beng.* 1855, xxiii. p. 296.

Eye very large; posterior frontals twice as large as anterior. Scales in seventeen rows.

Ventrals 164-166; subcaudals 130-146. Prevailing hue of the upper parts a dull vinaceous; many of the scales margined with black, and some with yellow; a series of yellow spots (about fifty in number) continued along the spine to the extremity of the tail, with a row of black spots on either side. A slight, whitish, V-like mark on the occiput. Lower parts yellowish white, with specks and powdering of dusky, more prevalent towards and on the tail.

Two specimens closely resemble each other, but a third presents some differences of colour: the row of yellow spots is wanting along the spine, also the dark band on the nape and the pale V-like occipital mark; the under parts also are more uniformly whitish. Ventrals 168; subcaudals 124.

From the vicinity of Darjiling. Length 31 inches, of which the tail is $6\frac{1}{2}$ inches.

TROPIDONOTUS PLATYCEPS. (Plate XXII. fig. D.)

Tropidonotus platyceps, Blyth, *Journ. As. Soc. Beng.* 1855, xxiii. p. 297. *Günth. Proc. Zool. Soc.* 1860, p. 162.

Head of moderate length, rather depressed, distinct from neck; body and tail slender. Scales in nineteen rows, with very feeble keels. Ventrals 173-186; subcaudals 90-96. Anterior frontals rounded in front, half as large as posterior; occipitals much longer than vertical. Loreal square; one præocular (sometimes split into two), just reaching to the upper surface of the crown: two postoculars. Eight upper labials, the third, fourth, and fifth of which enter the orbit, the sixth and seventh being the largest. Temporals 1+1+3. Each maxillary is armed with ten teeth, which gradually become longer and are more widely set posteriorly; there is another tooth, considerably larger than the others, at the end of the bone, placed at some distance from the continuous series. Brown or brownish olive above, uniform or with a pair of pale dorsal bands; belly yellow, with a more or less distinct blackish stripe along each side; chin and throat and the lower parts of the tail sometimes entirely black. Rostral shield with a black vertical streak. A blackish streak from behind the eye to the angle of the mouth; males with a yellow streak from the nostril through the lower part of the orbit to the angle of the mouth, ascending on the side of the neck. During life a coral-red streak runs along the edges of the ventral shields.

A variety of this species is very similar in its coloration to the European *Coronella lavaia*, having black specks on a light-brown ground-colour; the keels of the scales can only be seen with some difficulty.

This species is found in different parts of the Himalayas (in Nepal, Sikkim, Khasya), at an elevation of from 4000 to 9000 feet. I found the eggs of a lizard or of another snake in the stomach of one of the specimens. It attains to a length of 30 inches, the tail measuring $8\frac{1}{2}$ inches.

We have given three views of the head, of the natural size.

TROPIDONOTUS SUBMINIATUS.

Tropidonotus subminiatus, (Reinw.) Schleg. *Phys. Serp.* ii. p. 313. Blyth, *Journ. As. Soc. Beng.* 1855, xxiii. p. 296.

Amphiesma subminiatus, *Dum. & Bibr.* vii. p. 734.

Head of moderate length, rather depressed, distinct from neck; body and tail of moderate length; eye of moderate size. Scales in nineteen rows. Ventrals 142-168; subcaudals 70-88. Anterior frontals subtruncated in front; occipitals somewhat pointed behind, longer than vertical. One præocular, extending on to the upper surface of the crown; three postoculars. Loreal square. Eight upper labials, the third, fourth, and fifth entering the orbit; temporals rather irregular—there are always two elongate anterior temporals, in contact with the postoculars. Each maxillary is armed with twelve slender and rather distant teeth; there are one or two much longer and stronger teeth behind, not continuous with the series of small teeth. Greenish above, uniform or with small indistinct black and reddish-white spots; the vicinity round the eye whitish, with an oblique triangular black spot below, occupying the suture between the fifth and sixth labials. Belly white, with an irregular series of black dots on each side. Young specimens with a broad black collar edged with yellow behind; this collar gradually disappears with age.

This species belongs to the fauna of the eastern portion of the Indian continent and of some of the islands; I have examined specimens from China, CochinChina, Siam, Khasya, Sikkim, the Tenasserim coast, and Java*. One of the largest examples measures 42 inches, the tail being 10½ inches.

TROPIDONOTUS HIMALAYANUS. (Plate XXII. fig. H.)

Head of moderate width and length, rather depressed, distinct from neck; body and tail rather slender; eye of moderate size. Scales in nineteen rows, strongly keeled. Ventrals 171; subcaudals 85. Anterior frontals truncated in front, half as large as posterior; vertical five-sided, with the lateral margins convergent, and with a right angle behind; occipitals rather longer than vertical, rounded behind. Loreal square; one præocular, reaching to the upper surface of the head; three postoculars; eight upper labials, the fourth and fifth of which enter the orbit. Temporals 1+2. Each maxillary is armed with a continuous series of eighteen slender teeth, followed at some distance by one or two strong but not very long posterior teeth. Brownish olive above, with two dorsal series of numerous small quadrangular transverse yellow spots, more distinct on the posterior half of the trunk than on the anterior; an indistinct yellow collar, behind which the trunk is variegated with yellowish; upper labials with a narrow black hinder edge. Chin and throat uniform yellow; anterior half of the belly clouded with brownish, posterior gradually becoming entirely blackish brown.

* The British Museum has also received two examples from the East India Company, marked "Dukhun. Col. Sykes."

I have examined two specimens of this species, one from Sikkim, the other from Nepal, both perfectly alike. The former is 31 inches long, the tail measuring 8 inches.

An upper and lateral view of the head have been given, from the Sikkim specimen, of the natural size.

TROPIDONOTUS ANGUSTICEPS.

Tropidonotus angusticeps, Blyth, *Journ. As. Soc. Beng.* 1855, xxiii. p. 295.

Head narrow, not broader than the neck, little depressed. Scales in seventeen rows. Ventrals 167-172; subcaudals 57-67. Two or three (four) præorbitals, four (five) post-orbitals. Colour (in spirits) plumbeous above, uniformly spotted with black throughout; below whitish, more or less variegated with black on the hinder half; head without markings, but a V-like mark on the nape, with the apex towards the occiput, becoming obsolete in adults. A specimen with four præ- and five post-orbitals is remarkable for having no dark markings above, but some indistinct pale spots.

Length of an adult 41 inches, of which the tail is $8\frac{1}{2}$ inches. Inhabits Assam and Arakan. I have not seen this species.

TROPIDONOTUS STOLATUS.

Coluber stolatus, Linn. *Syst. Nat.* i. p. 379.

Russell, *Ind. Serp.* i. pl. 10; ii. pl. 15. B (young), and pl. 19.

Tropidonotus stolatus, Boie, *Iris*, 1827, p. 535. *Schleg. Phys. Serp.* p. 317. Cantor, *Mal. Rept.* p. 90. *Amphisma stolatum*, Dum. & Bibr. vii. p. 727.

Head rather narrow, body and tail of moderate length, eye of moderate size. Scales in nineteen rows. Ventrals 125-161*; subcaudals 50-79. Anterior frontals pointed in front; occipitals rounded behind, not much longer than vertical. One præocular, extending on to the upper surface of the crown; three (four) postoculars. Loreal square. Eight upper labials, of which the third, fourth, and fifth enter the orbit; the third and fourth are sometimes united into one shield; temporals large, 1+1. Each maxillary is armed with seventeen teeth, which become larger and more distant posteriorly; at some distance behind this series there are one or two much larger teeth. Greenish or brownish olive, with numerous narrow, serrated or reticulated cross bars, intersected by two yellow or white longitudinal dorsal bands. Lower parts white; the anterior ventral shields have frequently a black dot on each side. Head brown above, the shields more or less distinctly edged with black; præocular

* In a specimen from China 125, in a male from Madras 128, in a female 138, in one from Ceylon 144, in one from Nepal 157, in one from Khasya 161. Cantor found in specimens from Pinang 143-156.

and postoculars white, the former with a black anterior margin; the suture between the fifth and sixth and between the sixth and seventh upper labials black.

A male in the breeding-season, from Madras, is figured by Mr. Walter Elliott with the throat yellow, and with the ground-colour of the anterior part of the body red.

This is perhaps the most common species of snake on the East Indian continent, ranging from Ceylon through the Peninsula along the southern slope of the Himalayas to southern China (Formosa); it is scarcer in the Malayan Peninsula and the northern parts of Siam, and appears to be entirely absent in the Archipelago. It is of very gentle habits, feeding on small frogs; it attains to a length of 2 feet, but generally remains within smaller proportions.

This species is readily recognized by the peculiar pattern of its coloration, but varies much in the relative length of the body and tail, on which also depends the number of ventral and subcaudal shields and of the black cross bands. The presence of seven upper labials is not uncommon; but the occurrence of four postoculars is more so. *Single* specimens may be found which deviate so much from the type that they might be taken for another species. Thus, for instance, an old example from Khasya has two postoculars only, seven upper labials, 161 ventrals, and a very dark coloration.

TROPIDONOTUS MONTICOLA.

? *Tropidonotus monticolus*, Jerdon, *Journ. As. Soc. Beng.* xxii. p. 530.

Head rather narrow, body and tail slender, eye large. Scales in nineteen rows. Ventrals 142; subcaudals 82. Anterior frontals truncated in front, half as large as posterior; occipitals rounded behind, not much longer than vertical. One preocular, extending on to the upper surface of the head; three narrow postoculars. Loreal large, quadrangular. Eight low upper labials, the third, fourth, and fifth of which enter the orbit. Temporals small, 2+2+3. Each maxillary is armed with eighteen small teeth and with a large posterior tooth separated from the others by an interspace. Green above, with about twenty-eight black bands across the trunk, each cross band being divided into three square spots by a pair of lateral bands not distinct from the ground-colour; there is a white dot where the longitudinal band intersects the cross bars. The first cross band is paler than the others and occupies the occiput; it has a white anterior edge; a pair of white dots between the eyes; a black dot on the suture between the fifth and sixth upper labials. The lower parts are white; the lateral black spots, however, extend somewhat on the ventral shields.

The meagre description of *T. monticola* given by Mr. Jerdon leaves it somewhat uncertain whether we are correct in referring a specimen 14 inches long, and found by Captain Beddome in the Anamallay Mountains, to that species. Mr. Jerdon says that it is common in the Wynad.

TROPIDONOTUS JUNCUS. (Plate XXII. fig. F.)

Tropidonotus juncus, Cantor, *Mal. Rept.* p. 98.

— dipasa, Blyth, *Journ. As. Soc. Beng.* 1855, xxiii. p. 297, & xxiv. p. 716.

Head narrow, rather depressed, distinct from neck; body and tail slender; eye rather large. Scales in nineteen rows. Ventrals 154-159; subcaudals 86. Anterior frontals truncated in front, half as large as posterior; occipitals considerably longer than vertical, rounded behind. Loreal square; one preocular, extending on to the upper surface of the head; three narrow postoculars. Nine low upper labials, the fourth, fifth, and sixth entering the orbit. Temporals arranged in two longitudinal series; the upper series contains three small shields adjoining the occipital, the lower two larger ones. Each maxillary is armed with a continuous series of fifteen small teeth, and with a posterior longer and stronger tooth placed at some distance behind the series. Greyish olive above, with a series of well-defined rounded whitish spots along each side of the back; belly whitish, a black dot on each side of each ventral and subcaudal shield. Lips and throat gamboge; a gamboge band ascends obliquely from the angle of the mouth to the neck, joining its fellow at an acute angle; this band is less distinct in adult specimens than in young ones.

Since the publication of the 'Colubrine Snakes' in 1858, we have received the typical specimen of *T. juncus* of Cantor, so that I have convinced myself that it is a valid species; it was captured on the Great Hill of Pinang, and is 27 inches long, the tail measuring $7\frac{1}{2}$ inches. Another young specimen has been received from Chikiang. Dr. Cantor observes that it is of fierce habits and very ready to bite. It is said to occur also in the vicinity of Darjiling.

The figures on Plate XXII. (upper and lateral views of the head) have been taken from the typical specimen, and are of the natural size.

TROPIDONOTUS CEYLONENSIS. (Plate XXII. fig. G.)

Tropidonotus chrysargus, var. *ceylouensis*, Günth. *Colubr. Snakes*, p. 71.

Head of moderate width and length, distinct from neck; body and tail of moderate length; eye rather large. Scales in nineteen rows, strongly keeled. Ventrals 137; subcaudals 60. Anterior frontals obtusely rounded in front, half as large as posterior; vertical five-sided, with the lateral margins slightly convergent and with a right angle behind; occipitals not much longer than vertical, obtusely rounded behind. Loreal quadrangular; two preoculars, of nearly equal size, the upper reaching to the upper surface of the head; three narrow postoculars; eight low upper labials, the fourth and fifth of which enter the orbit; temporals 2+3, the lower anterior being the largest. Each maxillary is armed with a continuous series of twenty small teeth, followed at some distance by a much larger posterior tooth. Brownish olive above; a series of about twenty yellow ocelli, edged with black, along each side of the body; the black edges are dilated into cross bands extending down-

wards to the side of the belly and upwards to the ocelli of the other side. The ocelli of both sides are generally not opposite to each other but alternately placed. Belly uniform yellowish, greyish towards behind. A broad black band runs from the eye to the angle of the mouth, and is continued along the side of the neck.

We have only one (immature) specimen of this species, 11 inches long, tail $2\frac{1}{2}$ inches. It is from Ceylon. Closely allied to *Trop. chrysargus* from Java, but with fewer upper labials and with a different coloration.

TROPIDONOTUS BEDDOMII. (Plate XXII. fig. E.)

Spilotes vittatus, Beddome, *Madras Quart. Journ. Med. Sc.* vol. v.

Head of moderate width and length, distinct from neck; body and tail of moderate length; eye rather large. Scales in nineteen rows, strongly keeled. Ventrals 146; subcaudals 70. Anterior frontals obtusely rounded in front, half as large as posterior; vertical five-sided, nearly twice as long as broad; occipitals nearly as long as vertical and posterior frontals together, truncated behind. Loreal quadrangular, as high as long; one præocular, extending on to the upper surface of the head, but not reaching the vertical; three postoculars; nine low upper labials, the fourth, fifth, and sixth of which enter the orbit; temporals elongate, 1+2, the anterior in contact with the two lower oculars. Brown above; a series of small, short, transverse streaks of orange-colour along each side of the back; a narrow yellow cross bar behind the occipitals; labials edged with black; a yellowish, black-edged band from the eye to the angle of the mouth. Belly whitish, its sides and the subcaudals dotted with brown.

Captain Beddome, who discovered this species in the Nilgherries, has kindly sent me the typical specimen of his *Spilotes vittatus*; it is a *Tropidonotus* allied to *T. ceylonensis*; but the specific name proposed by him cannot stand, as it is already given to the common Javan species. The specimen is very young, only $8\frac{1}{2}$ inches long, the tail measuring $2\frac{1}{2}$ inches. Several discrepancies in my description and that of Captain Beddome appear to indicate that he has confounded this new species with some other *Tropidonotus* under the same name.

TROPIDONOTUS NIGROCINCTUS.

Tropidonotus nigrocinctus, Blyth, *Journ. As. Soc. Beng.* 1856, xxiv. p. 717.

Scales in seventeen rows. Ventrals 160; subcaudals 81. The penultimate and antepenultimate upper labials very large. Olive-grey above, passing into bright green towards the head, and conspicuously marked throughout with a series of about fifty narrow transverse black bands, some perfect, others broken and alternating; head with two broad black lateral streaks, one from behind the eye to the cleft of the mouth, the other below the eye; a narrow and indistinct black band edging the occipital plates posteriorly; and behind this

a broad pale collar, which was probably bright red above in the living snake. Lower parts white, each shield beginning to be margined with grey from about the twentieth; and this grey gradually darkening posteriorly, until towards and upon the tail it becomes blackish and occupies half of each shield; besides which a row of small lateral spots may be traced.

Length of specimen $26\frac{1}{2}$ inches, of which the tail measures $6\frac{1}{2}$ inches. This species appears to inhabit either Pegu or Tenasserim.

TROPIDONOTUS FLAVIPUNCTATUS.

Amphiesma flavipunctatum, *Hallowell, Proc. Acad. Nat. Sc. Philad.* 1860, p. 503.

Head small. Scales in seventeen rows. Ventrals 128; subcaudals 78. Three or four postoculars; upper labials eight, the eye resting on the third and fourth. Dusky yellow, with numerous yellow spots along the margins of the scales; a black undulating band running transversely behind the occiput, and two oblique ones on the side of the head: one commencing at the inferior margin of the eye, passing over the lower postocular, and extending between the fifth and sixth upper labials to the margin of the jaw; the other commencing behind the postorbital and extending obliquely across the temples, and terminating at the inferior and posterior margin of the seventh upper labial. Lower parts yellow, the posterior margin of each ventral edged with black.

Hongkong, Canton River. Total length $21\frac{1}{2}$ inches, of which the tail is $6\frac{1}{2}$ inches.

TROPIDONOTUS ZEBRINUS.

Tropidonotus zebrius, *Blyth, Journ. As. Soc. Beng.* 1855, xxiii. p. 295.

Mr. Blyth gives the following description:—

"Scales in fifteen rows; ventrals 137; subcaudals 96. One pre- and three post-orbitals. Upper parts (in spirits) deep plumbeous, obscurely spotted with black; the sides and under parts yellowish white, the former throughout banded with black, and each band having a whitish spot above it. Labial plates with a triangular black spot at the point of junction of each of them above. Two or three distinct black bands across the nape.

"Length of specimen (which is quite young) $10\frac{1}{2}$ inches, of which the tail measures $8\frac{1}{2}$ inches*.—From Mergui."

* Evidently erroneous.

TROPIDONOTUS TIGRINUS.

Tropidonotus tigrinus, Boie, *Leis*, 1826, p. 206. *Schleg. Phys. Serp.* ii. p. 315, and *Faun. Japon.*, *Ophid.* tab. 4.

Amphisma tigrinum, Dum. & Bibr. vii. p. 732.

Tropidonotus lateralis, Berthold, *Gött. Nachr.* 1859, p. 180.

— *orientalis*, Günth. *Ann. & Mag. Nat. Hist.* 1862, January, pl. 9. fig. 3.

Head of moderate length, rather depressed, distinct from neck; body and tail of moderate length; eye of moderate size. Scales in nineteen rows. Ventrals 152-168; subcaudals 62-80. Anterior frontals truncated in front, more than half as large as posterior. Two preoculars, the upper extending on to the upper surface of the head; four (three) postoculars. Loreal square; seven upper labials, the third and fourth entering the orbit; temporals 1+2. Each maxillary is armed with ten or twelve slender teeth, slightly increasing in strength posteriorly; at a short distance behind this series there is another tooth, stronger and longer than the others. Greenish or brownish olive, with three series of subquadrangular black spots; a series of reddish spots on the anterior part of the side, these spots alternating with the black ones. Belly with a series of rounded small black spots anteriorly, nearly entirely black posteriorly; neck with an oblique black spot on each side. A black spot below the eye, on the suture between the fourth and fifth labials; a black blotch on the temple descending obliquely to the angle of the mouth.

This species is the representative of the European *T. natrix* in Japan and Northern China, and attains to the same size.

TROPIDONOTUS LEUCOMELAS. (Plate XXII. fig. I.)

Head rather short, thick, distinct from neck; body and tail of moderate length; eye of moderate size. Scales in nineteen rows, strongly keeled; anal bifid. Ventrals 129; subcaudals 61. Anterior frontals truncated in front, not quite half as large as posterior. Vertical large, five-sided, with parallel lateral margins and with an obtuse angle behind; occipitals not much longer than vertical, rounded behind. Loreal quadrangular. One preorbital, reaching to the upper surface of the head; three postorbitals. Seven upper labials, the fourth being elongate and forming the entire lower margin of the orbit. Temporals elongate, 2+3. Each maxillary is armed with twelve teeth, gradually increasing in length behind; at a very short distance behind this continuous series there is a very long posterior tooth. Black above, with twenty-three very narrow white rings round the trunk; belly white anteriorly, brownish posteriorly. Neck with a broad black collar, behind which is a yellow ring as broad as the collar. Head uniform greenish olive.

The single specimen of this very distinct species is evidently young, 8 inches long, the tail measuring $1\frac{3}{4}$ inch. It is said to be from Pinang.

TROPIDONOTUS PLUMBICOLOR.

Tropidonotus plumbicolor, Cantor, *Proc. Zool. Soc.* 1839, p. 54.

Xenodon viridis, Dum. & Bibr. vii. p. 763. Günth. *Colubr. Snakes*, p. 57.

Head broad, body stout, tail short. Scales in twenty-five rows, sometimes in twenty-three or twenty-seven. Ventrals 160-161; subcaudals 42. Two pre- and three post-oculars. Seven upper labials, the third and fourth entering the orbit; temporals 2+3. Vertical five-sided, anterior margin as long as lateral; occipital not twice as large as vertical; anterior frontal more than half as large as the posterior; the præorbital scarcely reaches to the upper surface of the head. Each maxillary is armed with eight small teeth, and with a very long posterior one separated from the others by a considerable interspace. Dirty greenish: young specimens with a broad white collar, pointed in front and forked behind, preceded by a similar black spot, the point of which extends to the vertical shield and is edged with black behind; an oblique black streak behind the eye; trunk with ten or eleven narrow black cross bars, and generally with a black lateral spot in the middle of the interspaces of the cross bands. Sides of the throat dotted with black; belly more or less blackish. *All these markings generally disappear with age*, with the exception of an oblique, more or less distinct blackish band on each side of the neck,—the upper parts being uniform dirty green, the lower whitish.

This species is not uncommon in the Madras Presidency, and frequently enters houses; it attains to a length of 25 inches, the tail measuring 3 inches.

ATRETIIUM.

Atretium, Cope, *Proc. Acad. Nat. Sc. Philad.* 1861, p. 299.

Body cylindrical, rather stout; head narrow; eye of moderate size, with round pupil. The anterior frontals are united into one triangular transverse shield, which is in contact with the rostral. The other shields of the head are regular. Two nasals; the nostril is in the upper part of the suture between them, but on the side of the head. Scales rather short, rhombic, keeled, in nineteen rows. Ventrals broad, rounded; anal bifid; subcaudals two-rowed. Teeth numerous, those of the maxillaries increasing in length posteriorly, forming a continuous series.

Only one species is known, forming the transition from *Tropidonotus* to the true fresh-water snakes. Cantor says that it is very fierce, and prepares to attack by raising the head 3 or 4 inches vertically from the ground, and that it has the power of flattening and laterally expanding the skin of the anterior part of the body, like *Naja*, but in a much slighter degree. Frogs and fishes form its food.

ATRETIVM SCHISTOSUM.

Chitsee, *Russell, Ind. Serp.* ii. pl. 4.

Coluber schistosus, *Daud. Rept.* vii. p. 132.

Tropidonotus schistosus, *Schleg. Phys. Serp.* ii. p. 319. *Cantor, Mal. Rept.* p. 91. *Dum. & Bibr.* vii. p. 596.

— mœstus et surgens, *Cantor, Proc. Zool. Soc.* 1839, p. 54.

Tropidophis schistosus, *Gray, Viper. Snakes*, p. 69.

Head rather narrow, not very distinct from neck; body and tail of moderate length. Scales in nineteen rows, those of the dorsal series keeled. Ventrals 147-150; subcaudals 80-83. Anterior frontal triangular, broader than long, broadly joined to the rostral, as large as one of the posterior frontals. Vertical five-sided, nearly twice as long as broad, with the lateral margins slightly concave; occipitals somewhat longer than vertical. Loreal higher than long; one præocular, extending on to the upper surface of the head; three post-oculars. Eight upper labials, the third and fourth of which enter the orbit. Specimens from Madras have nine labials, the fourth and fifth entering the orbit. Temporals rather irregular: the anterior and those joining the occipital are elongate; two are in contact with the postoculars. Each maxillary is armed with sixteen teeth. Upper parts uniform blackish olive; labial shields, the outer or the two outer series of scales and the lower parts uniform yellowish. Young specimens with a blackish (during life purple) stripe from the orbit along the anterior part of the body.

This snake attains to a length of more than 2 feet; it is found in Ceylon and in Southern India, extending eastwards to Bengal and to the Malayan peninsula, where, however, it is scarce. According to Duméril and Bibron it is found also in the Philippine Islands and in Madagascar, but this is very doubtful.

XENOCHROPHIS, *Gthr.*

Body cylindrical, rather stout; head narrow, elongate; eye with the pupil round. Nostril lateral, situated in the upper part of a single plate. Shields of the head regular. Scales keeled, in nineteen rows; ventrals rounded; anal bifid; subcaudals two-rowed. No conspicuously longer teeth; they are widely set, those in the middle of the maxillary series and those in front of the mandible being rather larger than the others.

Only one species is known.

XENOCHROPHIS CERASOGASTER.

Psammophis cerasogaster, Cantor, *Proc. Zool. Soc.* 1859, p. 52.

Tropidonotus cerasogaster, Cantor, *Mal. Rept.* p. 92. *Gunth. Colubr. Snakes*, p. 79.

Head narrow, elongate, not very distinct from neck; body and tail of moderate length; eye rather small, superciliary somewhat projecting. Scales in nineteen rows; anal bifid; ventrals 141-149; subcaudals 60-69. All the shields of the upper part of the head elongate; anterior frontals rather pointed in front, not much smaller than posterior. Nasal quadrangular, entire, pierced in the middle of its length by the nostril. Loreal large; one præocular, extending on to the upper surface of the head; three postoculars, the lower of which is the largest and sometimes split into two. Nine upper labials, only the fourth entering the orbit. Temporals 3+3, two of the anterior being in contact with the postoculars. Each maxillary is armed with twelve slender widely-set teeth, the middle of which are the longest; ten or eleven teeth in each mandible, those in front being the longest, the others gradually decreasing in length posteriorly; a series of fourteen similar teeth along each side of the palate. Brown above, sometimes uniform, sometimes with a pair of lighter dorsal bands, sometimes with indistinct quadrangular dark spots. Lower parts purple, marbled with darker, or entirely black; a bright-yellow lateral band runs from the snout along the upper labials and the edge of the abdomen to the extremity of the tail. Occiput sometimes with a pair of yellow dots.

This most singular snake is found in the Malayan peninsula, Bengal, Assam, and Khasya, and grows to a length of above 2 feet, the tail measuring one-fourth. It is not numerous. It is very fierce, and attacks in a vertical attitude, but without expanding the anterior part of the body. It feeds on frogs and fishes.

PRYMNOMIODON, Cope.

Form slender, head moderately distinct. Shields of the head normal: two nasals, a loreal, one præocular. Scales keeled, in nineteen series. Ventrals not angulated, about 150 in number; anal entire. Pupil round. Palatine teeth very little longer than pterygoids; maxillary teeth minute posteriorly, becoming much longer anteriorly; none grooved.

Only one species is known.

PRYMNOMIODON CHALCEUS.

Prymnomiodon chalcus, Cope, *Proc. Acad. Nat. Sc. Philad.* 1860, p. 558.

I have not seen this snake. It is described from a single example. 12 $\frac{3}{4}$ inches long.

without tail, and said to be from Siam. Cope says that it is similar in appearance to a *Tropidonotus*, and describes it as follows:—

“Muzzle rather narrow; rostral plate nearly as high as broad. Vertical rather large, its lateral borders converging, presenting a right angle posteriorly. Nasals equal in size. Loreal trapezoid, posterior inferior angle acute. Preocular not reaching vertical. Three postoculars. Eight superior labials, eye resting on fourth and fifth. Nine or ten inferior labials; postgenials separated, longer than the anterior. Scales in nineteen longitudinal rows, elongate, emarginate at the tip, those of the external row not larger than the others, keeled. *Gastrostege* 152.

“Olivaceous above, shading into leek-green upon the flanks, and greenish white upon the belly. A vertebral band of light green bordered with black extends from the occipital plates to the origin of the tail, involving one row and two half rows of scales. Another, narrower and paler band extends upon the third and fourth rows of scales upon each side from the neck to origin of the tail; this band is bounded above by an interrupted narrow black border. Temporal region lively green, plates of head and muzzle tinged with fulvous. Upper labials and preocular white: a narrow black postocular vitta.”

FAMILY OF FRESHWATER SNAKES—*HOMALOPSIDÆ*.

Body of moderate length, cylindrical or slightly compressed; head rather thick, broad, not very distinct from neck; tail strong, of moderate length, tapering, more or less prehensile and compressed at its root, especially in the males. Scales subequal in size, not much imbricate; ventrals rather narrow, sometimes bicarinate; anal bifid; subcaudals two-rowed. Eye small. The nostrils are situated anteriorly on the upper surface of the head, small, provided with a valvule; the nasals are much developed, so as considerably to reduce the anterior frontals in size, which, frequently, are confluent into a small single shield, or, if double, are very small, triangular. The other shields of the head also frequently deviate from the arrangement typical in the Colubrine Snakes. Cleft of the mouth of moderate width. All the Indian freshwater snakes of this family have a grooved fang at the hinder extremity of the maxillary bone.

The snakes of this family are thoroughly aquatic, and are only occasionally found on the beach; several of them even enter the sea, and in several points of their organization approach the truly marine snakes, with which they have been associated in Gray's system. They may easily be recognized by the position of the nostrils on the top of the snout, which enables them to breathe by raising but a very small part of their head out of the water; it is the same arrangement as that in the Crocodiles, Sea-snakes, and other aquatic

animals. Many have a distinctly prehensile tail, by means of which they hold on to projecting objects. Their food consists entirely of fish, and, in a few species, of crustacea also. All of them appear to be viviparous, and the act of parturition is performed in the water. They do not grow to any considerable size, are of a gentle disposition, and their bite would be by no means dangerous. They will not feed in captivity, and therefore die after a short time.

Synopsis of the Genera.

* *Snout without appendage.*

† *Five upper labials.*

Scales smooth, in from twenty-five to twenty-nine series *Fordonia*, p. 276.

Scales smooth, in nineteen series *Cantorina*, p. 277.

†† *More than five upper labials; ventrals not keeled.*

Occiput covered with scales *Cerberus*, p. 278.

Scales smooth; one anterior frontal *Hyporhina*, p. 280.

Scales smooth; two anterior frontals *Ferania*, p. 284.

Scales keeled; occiput shielded *Homalopsis*, p. 285.

††† *Ventrals with two sharp ridges.*

Scales smooth *Hipistes*, p. 286.

** *Snout with a pair of tentacles.*

Ventrals very narrow, bicarinate *Herpeton*, p. 288.

FORDONIA, Gray.

Head depressed, short, broad, scarcely distinct from neck; body stout, cylindrical; tail rather short, tapering, longer in males than in females, thick and strongly compressed in the former. Cleft of the mouth of moderate width, not angularly bent behind. Eye small, with vertical pupil. The whole upper surface of the head is shielded. Nostril directed upwards, in the middle of a simple nasal shield. Anterior frontal single, small, in contact with the rostral. Five upper labials. Scales smooth, without apical groove, in from twenty-five to twenty-nine series, those of the outer series with truncated apex in adult specimens. Ventrals rather narrow, the two or three last bifid; subcaudals two-rowed. Maxillary short, with three or four small teeth and with a longer grooved tooth behind; mandibular teeth very short. Viviparous.

Only one or two species are known.

FORDONIA UNICOLOR.

- ? *Homalopsis leucobalia*, Schleg. *Phys. Serp.* ii. p. 845. pl. 13. figs. 8, 9. Schleg. & Müll. *Verhand. Nat. Gesch. Nederl. Overz. Bezitt., Rept.* p. 61. tab. 8.
Homalopsis leucobalia, var., Cantor, *Mal. Rept.* p. 102. pl. 40. fig. 5 (head).
Fordonia unicolor, Gray, *Viper. Snakes*, p. 77.

Scales in twenty-five or twenty-seven, rarely in twenty-nine series. Ventrals 140-156; subcaudals 26-37. Anterior frontal much longer than broad, rather smaller than one of the posterior frontals; vertical six-sided, as long as broad, broader behind than in front; superciliary narrow; occipital longer than vertical, rounded behind; nasal larger than a posterior frontal; one preocular, two postoculars. Five large upper labials, the third of which enters the orbit. Temporals 2+3; only the upper anterior temporal is in contact with the postoculars. Two pairs of subquadrangular short chin-shields, subequal in size. Uniform blackish ash above, the lower parts and the three outer series of scales whitish.

We have received numerous examples of this species from Borneo, Ceram, and Pinang, where it is common in fresh waters as well as for some distance out at sea. It attains to a length of 25 inches, the tail measuring 3 inches. It is of sluggish, not fierce, habits. I have found only crustacea in its stomach, but Cantor has found fishes also. A female dissected by me had fully developed embryos in its oviduct.

Fordonia leucobalia, Schleg., from Timor, appears to differ in its coloration only, having white spots across the back.

CANTORIA, Girard.

Body subcylindrical, deeper than broad, and very much elongated. Tail moderate, thick at its base and conical posteriorly. Head depressed, continuous with the body. Mouth moderate. Eye very small. Anterior frontal single, in contact with the rostral. One loreal. Orbital plates constituting a complete circle around the eye. Scales moderate, smooth, shining, disposed in nineteen longitudinal series.

One species.

CANTORIA ELONGATA.

- Cantoria violacea*, Girard, in *U. S. Explor. Exped., Herpetol.* xx. p. 156. pl. 11. figs. 7-10 (not *Coronella violacea*, Cantor).

Eyes very small. Vertical as broad as long, large; occipitals of moderate size. Loreal

present; one præ-, one post-, and two sub-oculars. Five (or six ?)* upper labials. The single anterior temporal is large and elongate, the posterior are scale-like. Scales smooth, in nineteen series. Ventrals narrow, not keeled, 278 in number, the last two divided; anal bifid; subcaudals 64. Reddish violet above, with transverse bands of small whitish dots, indistinct towards the tail. Uniform whitish below; lower part of the tail marbled with brown.

The typical specimen was obtained in the neighbourhood of Singapore; it is 50 inches long, the tail measuring 6 inches. The supposition that it is identical with *Coronella violacea* of Cantor is utterly groundless, the latter species being a *Simotes* and having its ventral shields nearly a hundred less in number.

CERBERUS, *Cuvier*.

Head rather high, of moderate length and width; body cylindrical, its hinder part and the tail rather compressed. Cleft of the mouth wide, turned upwards behind. Eye small, with vertical pupil. Snout covered with shields, occiput with scales. Nostril situated on the upper side of the head between two nasals, the anterior of which is the larger, forming a suture with the corresponding nasal of the other side; two small triangular anterior frontals; eye surrounded by a ring of small orbitals, the superciliary being well developed; posterior upper labials divided transversely into two. Scales keeled, in from twenty-one to twenty-five rows; ventrals of moderate width; anal bifid; subcaudals two-rowed. Maxillary teeth in a continuous series, slightly increasing in length posteriorly, the last being grooved. Mandibular teeth longest in front, decreasing in strength and more closely set behind. Viviparous.

This genus extends through the whole of India, from Ceylon to the north coast of Australia. Only one species occurs in British India.

* One of the figures quoted represents five upper labials,—another, more than five: both are taken from the same individual.

CERBERUS RHYNCHOPS.

- Russell, Ind. Serp.* ii. p. 43. pl. 40, i. pl. 17.
Hydrus rhynchops, Schneid. Hist. Amph. i. p. 246.
Elaps boniformis, Schneid. Hist. Amph. p. 301.
Hurria schneideriana, Daud. Rept. v. p. 281.
Cerberus obtusatus, Cuv. Règne Anim.
 — *cinereus, Gray, Zool. Misc.* p. 64, and *Viper. Snakes*, p. 64. *Cantor, Proc. Zool. Soc.* 1839, p. 54.
Homalopsis schneideri, Schleg. Phys. Serp. ii. p. 341. pl. 13. figs. 6, 7.
 — *rhynchops, Cantor, Mal. Rept.* p. 94.
Cerberus boniformis, Dum. & Bibr. vii. p. 978.

Scales in twenty-three or twenty-five rows*, strongly keeled. Ventrals 132–148; sub-caudals 54–57 (–72, *Cantor*). The two anterior frontals together as large as one of the posterior; vertical generally broken up into smaller shields, sometimes perfect, elongate. Loreal as large as, or larger than, one posterior frontal, extending on to the upper surface of the snout. One præocular, sometimes split into two; two postoculars, one infraocular. Nine or ten upper labials, the fifth being below the infraocular; some (two to four) of the hinder upper labials split transversely into two. Temporals scale-like. Three pairs of chin-shields, of which the anterior are the largest, broadest in front and tapering behind; the second and third pairs are wedged in between the front pair and the lower labials. Upper parts blackish ash, with irregular, more or less distinct black cross bars; the two or three outer series of scales yellowish. Lower parts whitish, with numerous more or less confluent black blotches, the black colour being generally predominant over the ground-colour, and sometimes throwing up short vertical bars into the yellow lateral band. Labials spotted with black.

This species has a wide geographical range, as it inhabits not only the large islands of the East Indian archipelago, but also Ceylon, the peninsula of India, Bengal, the Malayan peninsula, and Siam. It is not known whether it occurs far inland; according to *Cantor* it is numerous in the Malayan countries in rivers and estuaries, and occasionally along the sea-coast. Its usual size is between 2 and 3 feet, the tail being one-fifth of the total length; but it attains to nearly 4 feet. The female brings forth eight living young, 7–7½ inches in length.

* A single specimen from Pinang has the scales in twenty-one rows in the middle of the body.

HYPSIRHINA, *Wagler*.

Head rather depressed; tail of moderate length, distinctly compressed at its root in the males. Cleft of the mouth of moderate width; eye small. The whole upper surface of the head is shielded. Nostril on the upper surface of the head, in a large nasal shield, the outer part of which is divided into two by a groove running outwards from the nostril. The nasals of both sides form a broad suture together behind the rostral; only a single anterior frontal; two posterior frontals. Scales smooth, without apical groove, in from nineteen to twenty-three series. Ventrals rather narrow; anal bifid; subcaudals two-rowed. Maxillary with a grooved tooth behind. Viviparous.

This genus is limited to the East Indies; the following species are known:—

Scales in nineteen rows	<i>H. plumbea</i> , p. 280.
Scales in twenty-one rows; ventrals 159-166; anterior frontal in contact with the loreal	<i>H. enhydrie</i> , p. 281.
Scales in twenty-one rows; ventrals 128; anterior frontal in contact with the loreal	<i>H. jagorii</i> , p. 282.
Scales in twenty-one rows; anterior frontal not in contact with the loreal	<i>H. bennettii</i> , p. 283.
Scales in twenty-three rows	<i>H. chinensis</i> , p. 283.

HYPSIRHINA PLUMBEA.

- Homalopsis plumbea*, *Boie, Isis*, 1827, xx. p. 550. *Schleg. Phys. Serp.* ii. p. 346. pl. 13. figs. 12 & 13.
Cantor, Mal. Rept. p. 101.
Hypsirhina plumbea, *Wagl. Syst. Amph.* p. 170. *Gray, Zool. Misc.* p. 66.
Coluber plumbeus, *Eyd. & Gerv., Voy. Favor.* v. p. 73. pl. 30. fig. 1.
Hypsirhina hardwickii, *Gray, Ind. Zool. c. fig.; Zool. Misc.* p. 67.

Head short, rather thick, distinct from neck; body and tail short, stout. Scales polished, short, rhombic, poreless, in nineteen rows. Anterior frontal as large as one of the posterior; vertical five-sided, much longer than broad, with parallel lateral margins, and with a right angle posteriorly; occipitals much longer than vertical, pointed behind. Loreal rather higher than long; one præocular, just reaching to the upper surface of the head; two postoculars. Eight upper labials, the eye above the fourth; the fifth either does not enter the orbit, or with its anterior angle only; temporals scale-like, 1+2+3. Two pairs of chin-shields, of nearly equal length, the posterior not touching each other in the median line. Ventral shields 120-131; anal bifid; subcaudals 29-44. Each maxillary is armed with nine teeth, increasing in length posteriorly, and with a long posterior grooved tooth. Brownish- or

greyish-olive above, uniform or with an irregular dorsal series of small black spots. The two or three outer series of scales yellowish, each scale spotted or edged with brown; lips and lower parts yellowish; a black central zigzag line along the subcaudals.

This species is not common, but widely spread, inhabiting Java, Borneo, Celebes, Formosa, the southern parts of China, Pachebone, and the Malayan Peninsula. It attains to a length of 21 inches, the tail measuring $2\frac{1}{2}$ inches.

HYPSIRHINA ENHYDRIS. (Plate XXII. figs. K, K'.)

- Mutta Pam, Ally Pam, *Russell, Ind. Serp.* i. p. 35. pl. 30.
 Hydrua enhydria, *Schneid. Hist. Amph.* p. 245.
 Homalopsis aer*, *Boie, Isis*, 1827, p. 550. *Schleg. Phys. Serp.* ii. p. 347. pl. 13. figs. 10 & 11.
 Hypsirhina aer, *Wagl. Syst. Amph.* p. 170. *Gray, Viper. Snakes*, p. 72.
 Coluber aer, *Eydoux & Gerv., Voy. Favor.* v. p. 74. pl. 30. figs. 2 & 3.
 Hypsirhina trilineata, bilineata, et furcata, *Gray, Zool. Misc.* p. 66.
 Homalopsis olivaceus, *Cantor, Proc. Zool. Soc.* 1839, p. 99.
 Hypsirhina enhydria, *Dum. & Bibr.* vii. p. 946.
 Homalopsis enhydria, *Cantor, Mal. Rept.* p. 99.

This is a very variable species as regards form. Sometimes it is slender, with a thin neck and narrow, elongate head; sometimes stout, with a somewhat slender neck and a triangular head: the former appear to be males, the latter females. But intermediate forms also occur. The scales are short, rhombic or rounded, without apical groove, constantly in twenty-one series. Anterior frontal much broader than long, in contact with the loreal; vertical elongate. Loreal square, or longer than high; one preocular, just reaching to the upper surface of the head; two postoculars. Eight upper labials, the eye being above the fourth. Temporals scale-like, 1+2+3. Two pairs of chin-shields, the posterior rather longer than the anterior, and not touching each other in the median line. Ventral shields 159-166; subcaudals 62-69. Each maxillary is armed with sixteen teeth, subequal in length, the last being stronger and grooved. Brownish olive above, the three outer series of scales and the belly whitish; a blackish line along each margin of the belly.

Var. α . Back without bands, and belly without spots.

Var. β . Back with two light longitudinal bands, convergent on the head; a brownish-red streak within the white lateral streak; belly without spots: *H. furcata*, Gray; *H. bilineata*, Gray.

Var. γ . Back with or without bands; belly with a central series of brown dots: *H. trilineata*, Gray.

This species is found in most parts of the East Indies, in Java, Borneo, the Malayan Peninsula, on the coast of Tenasserim, in Siam, Bengal, China, and, according to Jerdon, in Southern India; it attains to a length of 28 inches, the tail measuring $5\frac{1}{2}$ inches. Cantor has made the following observations on living specimens:—

* From a name, *Oular ayer*, given by the Javanese to this species.

"Numbers of this species may be seen in rivers, as well as in irrigated fields and estuaries, preying upon fishes, which, however, it refuses in a state of captivity. It is of timid and peaceful habits. A large female, after having been confined upwards of six months in a glass vessel filled with water, brought forth eleven young ones. During the process she lay motionless at the bottom of the vessel; the anterior part of the abdomen was retracted towards the vertebral column, while the muscles of the posterior part were in activity. Shortly after the parturition she expired, under a few spasmodic movements; and also two of the young ones died in the course of about two hours, after having, like the rest, shed the integuments. In length they varied from 6 inches to 6½. The living nine presented a most singular appearance: they remained a little way below the surface of the water, coiling themselves round the body of an adult male which was also kept in the vessel, occasionally lifting their heads above the surface to breathe, at the same time resisting the efforts of the senior to free himself. Fishes and aquatic insects were refused, in consequence of which the young ones expired from inanition in the course of less than two months."

We have figured the heads of two specimens, each in three views, to show the great differences of form. One (fig. K) is taken from the typical specimen of *Hypsirrhina bilineata*, Gray, from China; the other (fig. K') from a specimen collected by Griffith, probably in Khasya.

HYPsirrhina JAGORII.

Hypsirrhina jagorii, Peters, in *Monatsber. Berl. Acad.* 1863, p. 245.

Head narrow, elongate, depressed, rather distinct from neck, which is thin but short; trunk short, thick; tail somewhat compressed at its root. Eye small, prominent, with perfectly round pupil. Scales polished, short, rounded, without apical groove, in twenty-one rows, those of the outer series twice as large as the dorsal scales. Anterior frontal much broader than long, in contact with the loreal; posterior frontals small. Vertical five-sided, not quite twice as long as broad, pointed behind; occipitals small, rounded, not much longer than vertical. Loreal subpentagonal; one preocular, extending on to the upper surface of the head; two postoculars. Eight upper labials, the fourth below the eye; temporals scale-like, 1 + 2 + 3. Two pairs of chin-shields, the anterior of which are the largest, the posterior being separated from each other by two longitudinal series of scales. Ventrals 128; subcaudals 66 (Peters). Each maxillary is armed with a series of seven longish, closely-set teeth, at some distance behind which there is a somewhat stronger and grooved tooth. Brownish grey above, many isolated scales black; the third outer series of scales and the adjoining halves of the second and fourth yellowish white; the outermost series and the adjoining parts of the second and of the ventral shields blackish; many scales of the outermost series and the middle of the ventrals white.

A single specimen was sent by M. Mouhot from Siam; it is 12½ inches long, without the tail, which is injured.

Although our specimen differs in the coloration from that described by Peters, I have no doubt that both belong to the same species. The latter is said to have broad, bluish-black

cross bands on the sides, alternating with narrow yellow ones which either extend on to the other side across the belly, or alternate with the opposite bands. A series of large, rhombic dark spots along the back. This specimen also was from Siam.

HYPSIRHINA BENNETTII.

Hypsirhina bennettii, Gray, *Zool. Misc.* p. 67.

— maculata, *Dum. & Bibr. Erpét. gén.* vii. p. 950.

Head rather narrow, not very distinct from the neck, which is slender; body and tail of moderate length. Scales polished, short, rhombic, in twenty-one series. Anterior frontal very small, half as large as a posterior, not in contact with the loreal. Vertical five-sided, elongate, pointed behind; occipitals not much longer than vertical. Loreal quadrangular; one pre-, two post-oculars. Seven upper labials, the fourth entering the orbit. Temporals 1+2+3. Three pairs of chin-shields, the anterior being the largest and the middle the smallest; the shields of the two hinder pairs do not touch each other in the median line. Ventrals 158-161; subcaudals 47-51. Each maxillary is armed with from twelve to thirteen teeth, the last being somewhat stronger and grooved. Brownish grey above, with numerous irregular transverse black spots; the three outer series of scales and the belly are whitish; each ventral shield with three black dots, one on each side and one in the middle, and with anterior blackish margin.

This species appears to be peculiar to China, and attains to a length of 21 inches, the tail measuring 3½ inches.

HYPSIRHINA CHINENSIS.

Hypsirhina chinensis, Gray, *Zool. Misc.* p. 73.

Head of moderate width and length; neck more or less slender; body rather stout, its hinder part and the tail compressed. Scales in twenty-three rows, without apical groove; ventrals 150; subcaudals 44-45. Anterior frontal sometimes square, sometimes broader than long, as large as one of the posterior frontals; vertical twice, or more than twice, as long as broad. Seven upper labials, the fourth entering the orbit. Temporals not much larger than the scales, 1+2+3. Blackish ash above, with irregular series of small black spots; the second and third outer series of scales white, the outermost blackish; belly whitish, clouded with blackish on the anterior and outer margins of each ventral shield.

The larger of our specimens is 16½ inches long, the tail measuring 2½ inches; they are from China.

FERANIA, *Gray.*

Head short, thick; body stout, compressed; tail of moderate length; cleft of the mouth of moderate width; eye small, with vertical pupil. The whole upper surface of the head is shielded. Nostril on the upper surface of the head, in a large nasal shield, the outer part of which is divided into two by a groove running outwards from the nostril. The nasals of both sides form a broad suture together, behind the rostral; two very small anterior frontals. Scales smooth, without apical groove, in twenty-seven series. Ventrals rather narrow; anal bifid; subcaudals two-rowed. Maxillary with a grooved tooth behind.

Only one species is known.

FERANIA SIEBOLDII.

Homalopsis sieboldii, *Schleg. Phys. Serp.* p. 349. pl. 13. figs. 4 & 5. *Cant. Mal. Rept.* p. 98.

Ferania sieboldii, *Gray, Zool. Misc.* p. 67.

Trigonurus sieboldii, *Dum. & Bibr.* vii. p. 960.

Body stout and compressed; head thick, broad, short, rather distinct from neck; tail rather short. Anterior frontals small, triangular, half as large as posterior; vertical longer than broad, five-sided, with parallel lateral margins and with a right angle behind; occipitals but little longer than vertical, rounded behind. Loreal rather larger than an anterior frontal; one præ-, two post-oculars. Eight rather high upper labials, the fourth entering the orbit; temporals scale-like, 1 + 2 + 3. Anterior chin-shields convergent behind, in contact with four lower labials; the posterior chin-shields are small, scale-like, intercalated between the anterior and the lower labials. Scales elongate-ovate, in twenty-seven series. There are about six transverse series of scales between the chin-shields and the first ventral. Ventrals 147-156; subcaudals 48-55. Each maxillary is armed with seven equal teeth and with a longer posterior grooved tooth. White, with about thirty-two very large, rounded, brown, black-edged spots, the interspaces between them being narrow. A series of rather irregular, triangular black spots along the lower part of the side, these spots alternating with the rounded ones; belly checkered with black. The white ground-colour appears on the upper part of the head in the shape of two lines, diverging from the muzzle over the eyes to the sides of the head. From each side of the vertical shield a line diverging towards the head. Old examples have the head uniform brown.

A rare species, from Bengal and from the province Wellesley. It attains to a length of 25 inches, the tail measuring 4 inches.

HOMALOPSIS.

Homalopsis, sp., *Kuhl*.

Head rather depressed, flat, triangular, distinct from neck; body stout, cylindrical; tail of moderate length, tapering. Cleft of the mouth wide, turned upwards behind. Eye small, with vertical pupil. The whole upper surface of the head shielded. Nostril situated on the upper surface of the head, in a single nasal shield, the outer part of which, however, is divided into two by a groove commencing from the nostril and running outwards. The two nasals form a broad suture together behind the rostral; anterior frontal single, small (exceptionally divided); eye surrounded by a ring of small orbitals, the superciliary being well developed. Posterior upper labials transversely divided into two or three. Scales striated and keeled, in from thirty-seven to forty-seven series; ventrals rather narrow; anal bifid; subcaudals two-rowed. Maxillary teeth subequal in size, the last being grooved; mandibular teeth longest in front, decreasing in strength and more closely set behind. Viviparous.

Only one species is found in British India.

HOMALOPSIS BUCCATA.

Coluber buccatus, *L. Syst. Nat.* i. p. 377.

Russell, ii. p. 39. pl. 33 (young).

Homalopsis buccata, (*Kuhl*) *Schleg. Phys. Serp.* ii. p. 337. pl. 13. figs. 1-3. *Gray, Viper. Snakes*, p. 67. *Dum. & Bibr.* vii. p. 968. *Cantor, Mal. Rept.* p. 96.

— *hardwickii*, *Gray, Viper. Snakes*, p. 67.

— *semizonata*, *Blyth, Journ. As. Soc. Beng.* 1856, xxiv. p. 187.

Pythonia (!) *semizonata*, *Blyth, l. c.* xxviii. p. 297.

Scales in thirty-seven, thirty-nine, forty-one, forty-five, or forty-seven series, keeled. Ventrals 160-171; subcaudals 70-84. The single anterior frontal is broader than long, smaller than one of the posterior, its hinder margins being longer than the anterior; vertical generally transversely split. Occipitals subtriangular, as broad as long. Loreal much longer than high, sometimes divided into two. One or two præoculars, two postoculars; infraocular very narrow, irregular in shape. Upper labials high, the fifth or the sixth being below the infraorbital; there is a longitudinal groove between the upper labials and the shields above them; all the hinder upper labials are divided into two or three by transverse sutures. Temporals 1+2, scale-like. Three pairs of chin-shields, the anterior of which are the

largest, broadest in front and tapering behind; the second and third pairs are wedged in between the front pair and the lower labials, and they do not extend further backwards than the anterior. Brownish olive, with narrow, rather irregular, greyish, black-edged cross bands; a brown triangular spot on the snout, its point being directed backwards and on to the posterior frontals; a roundish spot on each side of the occiput; an oblique streak of the same colour as the spots runs from the præocular through the eye to the side of the neck, sometimes joining the first blackish-brown cross band. The three or five outer series of scales and the belly yellowish white; generally a series of black spots along each side of the abdomen: all these markings are much more distinct in young specimens. Broad blackish-brown cross bands, about thirty-seven in number, alternate with white ones, the width of which is only one-third or one-fifth of that of the brown ones. The lower parts of the tail are either marbled with brown or entirely black.

This snake is found in Java, in the Malayan Peninsula, and in Gamboja; it attains to a length of 42 inches, the tail measuring 10 inches. Cantor says that they are sluggish in their movements, and on dry land very awkward; the young ones are very gentle, and the old but seldom bite. The female brings forth six or eight living young at a time, each between 7 and 8 inches in length.

Homalopsis hardwickii was founded on a specimen with a divided loreal; but this is accidental in that individual, as specimens may be observed which have one loreal on one side and two on the other; the infraorbital of that specimen is somewhat narrower than is usually the case.

Pythonia semisonata, Blyth, is evidently founded on a specimen of this very common species, but which, accidentally, had some of the shields of the head and the last ventral shields divided.

HIPISTES, Gray.

Head short, depressed, distinct from neck; neck rather slender; body of moderate length; tail stout, compressed, tapering. Cleft of the mouth of moderate width, somewhat turned upwards behind; eye very small, directed upwards, with vertical pupil. The whole upper surface of the head is shielded: nostril on the upper surface of the head, in a single nasal shield, the outer part of which, however, is divided into two by a groove running outwards from the nostril. The nasals are separated from each other by a single narrow anterior frontal shield, which forms a suture with the rostral; two posterior frontals. Scales smooth, in thirty-nine series. Ventrals rather

narrow, divided into three portions by a pair of sharp lateral ridges, the central portion being much the largest; anal bifid; subcaudals two-rowed. Maxillary with a grooved tooth behind; two or three strong teeth in the palatine series.

Only one species is known.

HIPISTES HYDRINUS. (Plate XXIV. fig. H.)

Homalopsis hydrinus, Cantor, *Mal. Rept.* p. 104. fig. 4 (head).

Hipistes fasciatus, Gray, *Viper. Snakes*, p. 78.

Bitia hydroides, Gray, *l. c.* p. 63.

Rostral shield small, as high as long; anterior frontal short, cuneiform, broadest behind, much longer than broad; posterior frontals very small, hexagonal; vertical bell-shaped, elongate, broadest behind; supraciliaries elongate; two pairs of small occipitals, one pair behind the other, with a small central shield; sometimes the occipitals are more irregularly arranged. Nasal shield nearly twice as large as a posterior frontal, with the nostril behind its middle. Loreal large, subquadrangular; one preocular, extending on to the upper surface of the head, but not reaching the vertical; two postoculars, the lower of which is the larger, extending forwards and meeting the preocular. Seven upper labials, the fourth being below the suture between the pre- and post-ocular; the fifth, sixth, and seventh are the largest, higher than long. Temporals 2+3, the anterior being in contact with the postoculars, the posterior scale-like. One pair of long chin-shields, in contact with six lower labials. There are about six series of scales between the chin-shields and the first ventral. Scales smooth, without apical groove, elongate-ovate; the apex of each scale, however, being turned inwards, and not overlapping the root of the following scale, small square grooves remain between the scales. The ventrals are narrow, with a sharp ridge on each side, 163-161; subcaudals 34-35. Each maxillary is armed with twelve teeth gradually increasing in length posteriorly, the last being grooved. Pale ash-coloured above, with a few blackish specks on the neck, and with about forty-eight black cross bars on the back of the trunk and tail, each about half as wide as the interspaces of the ground-colour. Lower parts white.

This appears to be a semipelagic species, resembling a true *Hydrophis* in general appearance and colours; its discoverer has made the following observations:—"Of three individuals observed, two were captured in fishing-stakes placed in the sea off the shores of Keddah; a third was washed on shore by the waves on the coast at Pinang. The largest male was 19½ inches long, the tail measuring 2½ inches. It moved actively and without difficulty on the sand, and did not offer to bite. In one examined the stomach contained remains of two small pelagic fishes." It appears to be a scarce snake.

We have given two views of the head, and figures of portions of the trunk and belly, to show the peculiar structure of the shields and scales, and the coloration. The figures are of the natural size.

HERPETON.

Erpeton, Lacépède.

Head depressed, of moderate length, distinct from neck; snout terminating in two flexible, cylindrical, scaly tentacles; body and tail rather stout, rounded. Cleft of the mouth of moderate width, turned upwards behind. Eye small, with vertical pupil. Head shielded above, with the occipitals well developed. Nostril on the upper side of the head, in the middle of a large nasal, the outer portion of which is divided by a groove running outwards from the nostril. The nasals form a broad suture together; two small triangular anterior frontals; lateral shields of the head very small; eye surrounded by a ring of small orbitals, the superciliary being well developed; upper labials small; chin-shields small, narrow, oblique. Scales strongly keeled, in thirty-seven series; ventrals very narrow, each with two keels; anal bifid; subcaudals not differing from scales. Maxillary with the last tooth grooved.

Only one species is known.

HERPETON TENTACULATUM.

Erpéton tentaculé, Lacép. Bull. Sci. Soc. Philom. 1800, ii. p. 169.

Erpeton tentaculatus, Latr. Hist. Rept. iv. p. 190.

Homalopsis herpeton, Schleg. Abbild. p. 50, pl. 16 (from a discoloured specimen).

Herpeton tentaculatum, Günth. Proc. Zool. Soc. 1860, p. 114, pl. 23; and *Ann. & Mag. Nat. Hist.* 1861, viii. p. 266.

The nasal shields form a broad suture behind the rostral, each being as large as one of the posterior frontals; anterior frontals much smaller than posterior. Vertical broad, five-sided; occipitals well developed, rounded behind. Small portions, however, are broken off from the shields mentioned, and intercalated between the regular shields; they vary much in number in different individuals.

The rostral appendages are as long as the snout, and covered with scales similar to those in the loreal region; the upper labials are very small, from thirteen to fifteen in number; eye surrounded by a ring of small shields. The temporal region is covered with keeled scales similar to those on the neck. All the scales are keeled, in thirty-seven rows. Ventrals 133-136, each being only twice as large as a scale.

Having received specimens with the natural colours preserved, I may refer to the coloured figure given in the 'Proceedings of the Zoological Society.' The ground-colour of the broad back is brown or olive-brown, bordered on each side by a black line, which becomes indistinct posteriorly, and is more conspicuous in young specimens; these black lines are separated from each other by five or six series of scales, and show button-like swellings in regular interspaces; transverse black lines run obliquely from one line to the other, and are most conspicuous on the anterior part of the trunk, whilst they appear in the form of specks towards the middle of the length, entirely disappearing posteriorly. A blackish-brown band proceeds from the tentacle through the lower half of the eye along the side of the body to the end of the tail; it occupies two or three series of scales, and is separated from another similar band, running along the lower part of the side, by a brownish-yellow band-like interspace. The lower of the blackish bands is confluent with the upper on the side of the vent. The lower parts are brownish yellow, with a pair of darker longitudinal streaks flanking the abdominal shields. There is a series of white or faint rose-coloured, posteriorly black-edged, spots on each side between the ventral and the lower lateral band; they form very distinct and elegant markings in immature specimens, where they are continued to the vent, forming altogether twenty-four pairs; some of them are opposite to those of the other side, others alternate with them. These spots are less bright in old specimens, and distinct only on the anterior part of the belly. The lower lip has a yellowish margin, and there are two wavy yellow lines along the throat.

For more than half a century this snake was known from a single example only, and is still rare in collections. It has been found hitherto in the southern parts of Siam only, and it appears to be a local species even there. It is an aquatic snake; and its tentacles are probably employed as organs of touch, under water,—perhaps to discern its food, the nature of which is not known. The largest specimen known is 25 inches long, the tail measuring 6 inches.

The intestinal tract is narrow and much convoluted; in a specimen 25 inches long it has a length of $21\frac{1}{2}$ inches, measured from the pyloric end of the stomach to the vent—a distance of $5\frac{1}{2}$ inches. The first portion immediately behind the stomach is slightly bent, and half an inch long; then follows a large subcylindrical mass of twelve or thirteen convolutions, only $1\frac{1}{2}$ inch long, but measuring $17\frac{1}{2}$ inches when unfolded; the remainder of the tract is slightly undulated, and $3\frac{1}{2}$ inches long*.

* Prof. Peters (Monatsh. Acad. Berl. 1863, p. 247) says that *Herpeton* scarcely differs from *Hypsirhina* with regard to the convolutions of the intestinal tract. As this statement contradicts my observation, viz. that the *Homalopsides* have a simple intestinal tract, I take this opportunity of confirming the truth of Prof. Peters's remark. I recollect having received, at the time I examined *Herpeton*, some large, almost fresh specimens of *Fordonia*, a genus distinguished from the other *Homalopsides* by a short intestinal tract, and I based on it an observation which ought to have been confirmed by the examination of other genera. The peculiarity of the intestinal tract of *Herpeton* consists merely in the convolutions being concentrated into a shorter and more solid mass than in other *Homalopsides* (*Cerberus*, *Hypsirhina*, *Homalopsis*).

FAMILY OF DESERT SNAKES—*PSAMMOPHIDÆ*.

Body and tail generally elongate, sometimes stout, rounded; head very distinct from neck, narrow or thick, with the loreal region very concave. Scales smooth, in fifteen, seventeen, or nineteen rows; subcaudals two-rowed. Cleft of the mouth wide; nostril lateral; eye of moderate size, with round or vertical pupil. Shields of the head normal: posterior frontals rounded or angular behind; vertical narrow, superciliaries prominent; loreal present; one præ-, two post-oculars. One of the four or five anterior maxillary teeth is longer than the others, and the last is grooved.

Most of the species of this family belong to the fauna of tropical Africa, which also produces a slender form (*Psammophis elegans*). The other species are of a stouter habit, frequenting plains, or at all events living on the ground. The family approaches in some respects the *Dryophidæ*; but species of the latter family may always be distinguished either by the green coloration, or the horizontal pupil, or the absence of a long anterior maxillary tooth.

The Indian species belong to two genera:—

- | | |
|-------------------------------------|---------------------------------|
| Body more or less slender | <i>Psammophis</i> , p. 290. |
| Body rather stout | <i>Psammodynastes</i> , p. 292. |

PSAMMOPHIS, Boie.

Body and tail elongate; head with a rather long and pointed snout; loreal region concave, superciliaries prominent. Shields of the head regular: vertical long and narrow; loreal elongate. Scales lanceolate, smooth, flat, in from fifteen to nineteen rows. Anal bifid. Pupil round. Maxillary with the fourth or fifth tooth elongate, and with the last tooth grooved; front teeth of the lower jaw long.

One species of this African genus is found in British India.

PSAMMOPHIS CONDANARUS.

Condanarouse, *Russell, Ind. Serp.* i. p. 32, tab. 27 (not good).

Coluber condanarus, *Merr. Tentam.* p. 108.

Psammophis condanarius, *Blyth, Journ. As. Soc. Beng.* 1865, xxiii. p. 203.

Psammophis tenuata, *Günth. Ann. & Mag. Nat. Hist.* 1862, ix. p. 126.

Leptophis? bellii?, *Jerdon, Journ. As. Soc. Beng.* xxiii. p. 529.

Psammophis indicus, *Beddome, Madr. Quart. Journ. Med. Sci.* vol. v.

Body and tail slender, rather compressed; head elongate-triangular, rather pointed in front, distinct from neck. Eye of moderate size, with round pupil. Rostral shield as high as broad; anterior frontals small, subtriangular, with the front obliquely truncated, as long as broad; posterior frontals rather large, longer than broad, rounded behind, scarcely extending downwards on the side of the head. Vertical narrow, elongate, as long as the occipitals, which are rounded behind. Nostril in the middle between two shields; loreal quadrangular, twice as long as high; one preocular, extending on to the upper surface of the head, but not reaching to the vertical; two postoculars. Eight upper labials, the fourth and fifth entering the orbit. Temporals 1 + 3 + 3. Scales lanceolate, smooth, with a minute apical groove, in seventeen rows. Ventrals 176-182, without keel, bent upwards on the sides; anal bifid; subcaudals 80-90. The fifth or fourth maxillary tooth is long and strong; a series of from five to six small teeth between this tooth and the last grooved tooth; lower jaw with two pairs of strong teeth in front. Back brown, with a black edge along each side; a brown, black-edged band along the second outer series of scales, separated from the back by a brownish-grey band, and from the belly by a yellow one. Belly yellow, with a black line along each side. Head uniform light brown above; a yellow, black-edged streak runs from the rostral shield along the canthus rostralis, above the orbit to the neck; a second along the upper half of the labial shields. After the loss of the epidermis in preserved specimens, the dark-brown bands appear of a bluish-olive colour.

Russell's specimen was from Ganjam: we have lately received one from Chillianwallah: Beddome found it on the Nullay Mullay Hills (Kurnool District). It attains to a length of 40 inches, the tail measuring $8\frac{1}{2}$ inches.

A drawing in the possession of Walter Elliott, Esq., representing our snake, and named *Leptophis bellii*, has helped me to identify Mr. Jerdon's "*Leptophis? bellii?*"—a circumstance which must be mentioned in order to explain how it was possible to recognize it. Mr. Jerdon observes that he procured one specimen in a grassy plain at Falna. "It had killed and was swallowing a small *Vipera echis*." This is, perhaps, the only instance ever heard of, in which a non-venomous snake overpowered a venomous species.

PSAMMODYNASTES, *Gthr*

Body and tail rather stout; head with the snout short, and with the front part of the lips swollen; loreal region concave, superciliaries prominent. Shields of the head regular: anterior frontals very small; vertical narrow, elongate; one nasal, pierced by the nostril. Scales short, rhombic, smooth, without apical groove, in seventeen rows; anal entire. Pupil elliptic, erect. Anterior teeth in both jaws long, posterior maxillary tooth grooved.

Only two species* are known, one of which occurs in British India.

PSAMMODYNASTES PULVERULENTUS.

Psammophis pulverulenta, Boie, *Isis*, 1827, p. 547. *Schleg. Phys. Serp.* ii. p. 211. pl. 8. figs. 10 & 11; and *Abbild.* tab. 43. figs. 1-4.

Dipsas ferruginea, Cantor, *Proc. Zool. Soc.* 1839, p. 53. *Blyth, Journ. As. Soc. Beng.* xxiii. p. 298; xxiv. p. 715.

Psammodynastes pulverulentus, Günth. *Colubr. Snakes*, p. 140.

Head short, thick, with the canthus rostralis and the superciliaries prominent, and with the front part of the upper lips swollen; body rather stout, tail rather short. Rostral shield small, rather broader than long; anterior frontals very small, triangular; posterior frontals small, rounded behind; superciliaries much larger than vertical; occipitals rounded behind. Loreal as high as long; two preoculars: the upper is large, extending on to the upper surface of the head, but not reaching the vertical; the lower is very small, and sometimes quite rudimentary; two postoculars. Eight upper labials, the third, fourth, and fifth of which enter the orbit. Temporals rather irregular, generally 2+3+3. Three pairs of chin-shields, the middle of which are the smallest. Ventrals 146-167; subcaudals 50-59. Each maxillary is armed with from eight to nine teeth, the first or second of which is long and strong, the last grooved. The ground-colour is always very dark, dotted and speckled with black; the lower parts are lighter, the dots forming spots, which are arranged in two or three or more longitudinal series; the upper surface of the head generally with symmetrical dark longitudinal streaks. Sometimes the whole snake is black; sometimes a broad dark band runs along the side of the body,—the back, above the band, being of a lighter coloration. Other specimens show a vertebral series of large rhombic pale spots, the spots being either entire, or broken up into two; these specimens have also a white streak on each side of the head.

This snake has a very repulsive aspect: its dark, undefined colours, short and thick head, and swollen lips, caused by large hidden fangs, give it the appearance of a venomous snake; it

* *Ps. pictus*, Günth. *Colubr. Snakes*, p. 251. Borneo.

remains small, the largest specimen I have seen being only 21 inches long, the tail measuring $4\frac{1}{2}$ inches. It has a wide geographical range, occurring in Khasya, Sikkim, Assam, Pegu, Mergui, Cochinchina, Sumatra, Java, and the Philippine Islands.

FAMILY OF TREE SNAKES—*DENDROPHIDÆ*.

Body and tail much compressed or very slender and elongate; head generally elongate, narrow, flat, depressed, distinct from the slender neck; snout rather long, obtuse or rounded in front; cleft of the mouth wide; nostril lateral; eye of moderate size or large, with round pupil. Shields of the head normal. Scales generally narrow and much imbricate; ventral shields generally with two keels, rising on the sides; subcaudals two-rowed. No large fang either in front or in the middle of the upper jaw.

The snakes of this family are diurnal species, living in trees, and feeding chiefly on tree-lizards; they are found in all the tropical regions. The Indian species belong to the following genera:—

Vertebral scales not enlarged; no grooved tooth; one preocular, two nasals.	<i>Gonyosoma</i> , p. 293.
Vertebral scales not enlarged; no grooved tooth; two preoculars, one nasal.	<i>Phyllorhina</i> , p. 295.
A vertebral series of larger scales	<i>Dendrophis</i> , p. 296.
A grooved tooth behind	<i>Chrysocopeles</i> , p. 298.

GONYOSOMA, *Wagler*.

Body and tail elongate, strongly compressed, with more than 200 keeled ventral shields; head flat above, with the snout more or less elongate, distinct from neck; eye of moderate size, with round pupil. Shields of the head regular: loreal sometimes absent; one anterior, two posterior oculars; two nasals. Scales not much elongate, smooth or very faintly keeled. Anal bifid. Teeth subequal in size, none grooved.

The species known are East Indian; the following occur in British India:—

Scales in twenty-five rows	<i>G. oxycephalum</i> .
Scales in nineteen rows; loreal shield present	<i>G. gramineum</i> .
Scales in nineteen rows; loreal none	<i>G. frenatum</i> .

GONYOSOMA OXYCEPHALUM.

Coluber oxycephalus, *Boie, Isis*, 1827, p. 537.

Gonyosoma viride, *Wagl. Icon.* tab. 9.

Herpetodryas oxycephalus, *Schleg. Phys. Serp.* p. 189. pl. 7. figs. 8 & 9; and *Abbild.* taf. 44. figs. 1-9. *Cantor, Mal. Rept.* p. 80.

Alopecophis chalybaeus, *Gray, Ann. & Mag. Nat. Hist.* 1849, iv. p. 247.

Gonyosoma oxycephalum, *Dum. & Bibr.* vii. p. 213.

? *Aepidea robusta*, *Hallowell, Proc. Acad. Nat. Sci. Philad.* 1860, p. 488.

Scales in twenty-five rows, rather elongate and pointed, smooth, with a pair of apical grooves. Anterior frontals as broad as long, one-third the size of posterior. Vertical large, very broad anteriorly; occipitals rounded behind. Loreal very elongate; one large præ-orbital, in contact with the vertical; two postorbitals, the lower rather smaller than the upper. Two labials enter the orbit; there are four or five before, and three or four behind, the orbit. Ventrals 236-263; anal bifid; subcaudals 138-149. Sea-green, paler below; a blackish line runs from the nostril to the angle of the mouth; tail generally ochre-brown, separated from the trunk by a yellow ring. Sometimes entirely green.

This snake occurs in many of the large islands of the Archipelago—Java, Celebes, Borneo, the Philippines,—at Pinang, and in Tenasserim. We have a specimen 82 inches long, the tail measuring 19 inches. It is described as exceedingly strong and fierce, defending itself ferociously when attacked. It raises nearly the anterior third vertically from the ground before it strikes. The form and colour of the body clearly indicate its thoroughly arboreal habits.

GONYOSOMA GRAMINEUM. (Plate XXIII. fig. D.)

Body and tail rather elongate, strongly compressed; head flat, very distinct from neck, with the snout of moderate length. Eye of moderate size, with round pupil; nostril an oblique slit between two nasals. Scales smooth, with two apical grooves, not elongate, in nineteen rows. Rostral shield as high as broad, rounded above, just reaching the upper surface of the head; anterior frontals subquadrangular, rather broader than long, half as large as posterior; vertical five-sided, much longer than broad, with the lateral margins slightly convergent, and with an obtuse angle behind; occipitals truncated behind. Loreal square; præocular extending on to the upper surface of the head, but not reaching the vertical; two postoculars; nine upper labials, the fourth, fifth, and sixth of which enter the orbit; temporals 2+2+2, scale-like, the two anterior in contact with the oculars. Two pairs of chin-shields, subequal in length, in contact with seven labials. Ventrals 203; anal bifid; subcaudals 100. Each maxillary is armed with about thirteen small teeth, equal in size. Ventral shields keeled, bent up the sides. Upper and lateral parts uniform green, lower parts pale greenish; hinder part of the tail reddish olive.

We have seen only one example of this species, from one of Griffith's collections, and probably from Khasya. It is 14½ inches long, the tail measuring 3½ inches.

GOSYOSOMA FRENATUM.

Herpetodryas frenatus, Gray, *Ann. & Mag. Nat. Hist.* 1853, p. 390.

Gonyosoma frenatum, Günth. *Columb. Snakes*, p. 123.

Scales nearly smooth, only those of the dorsal series with faint keels, not elongate, in nineteen rows. Rostral shield much broader than high, flat; anterior frontals subquadrangular, rounded and narrow in front, rather broader than long, not quite half as large as posterior; posterior frontal bent downwards on the sides, in contact with the second and third labials; vertical of moderate size, with a right angle behind; occipitals rounded behind. Nostril between two nasals; loreal none, confluent with posterior frontal. One preocular, large, extending on to the upper surface of the head, but not reaching the vertical. Two postoculars. Nine low upper labials, the fourth, fifth, and sixth entering the orbit. Temporals irregular: two in front are elongate and in contact with the postoculars. Ventral shields keeled, the outer portion bent up the sides, 203; anal bifid; subcaudals 120. Maxillary teeth equal in length, the anterior being rather more feeble than the posterior. Entirely grass-green, paler below; ventral keel whitish. A black band runs from the loreal region through the eye to the angle of the mouth.

The only specimen known is from Khasya; it is $27\frac{1}{2}$ inches long, the tail measuring $7\frac{1}{2}$ inches.

PHYLLOPHIS, *Gthr.*

Body and tail moderately elongate, strongly compressed, with more than 200 keeled ventral shields. Snout not depressed, of moderate length; supraciliary rather prominent; head distinct from neck; eye of moderate size, with round pupil. Shields of the head regular: two anterior and two posterior oculars; one nasal. Scales not much elongate, keeled, in twenty-three rows. Anal bifid. Teeth subequal in size, none grooved.

Only one species.

PHYLLOPHIS CARINATA. (Plate XXI. fig. B.)

Rostral shield not quite as high as broad; anterior frontals subtruncated in front, more than half as large as posterior; posterior frontals rather broader than long, bent downwards on the sides; vertical five-sided, two-thirds as broad as long; supraciliaries not much smaller than vertical; occipitals rounded behind. Nostril round, open, in an undivided shield; loreal longer than high; two preoculars, the upper of which is the larger, and extending on to the upper surface of the head, but not touching the vertical; the lower is small, intercalated between the third and fourth labials. Two postoculars; temporals rather irregularly arranged, $2+2+3$, the two anterior being the largest and in contact with the postoculars.

Eight upper labials, the fourth and fifth entering the orbit. Two pairs of elongate chin-shields, the anterior being in contact with five lower labials. Scales rather strongly keeled, only the outermost series being composed of perfectly smooth scales. Ventrals 223; anal bifid; subcaudals 97. The teeth are subequal in size, of moderate strength; there are eleven in each maxillary. Upper parts uniform greenish olive (in spirits); a pair of black dots on the nape of the neck, and some very small, distant, black specks along the vertebral line. Lower parts uniform whitish.

I have examined only one specimen of this new species, said to be from China; it is 21 inches long, the head measuring 10 lines, and the tail $4\frac{1}{2}$ inches.

DENDROPHIS, *Boie*.

Body and tail very elongate, slender, compressed; head rather depressed, oblong, with the snout obtusely rounded in front. Eye rather large, with round pupil; nostril lateral, between two nasals. Shields of the head regular. Scales smooth, in thirteen or fifteen rows, those of the vertebral series more or less enlarged, triangular or polygonal; the other scales much imbricate and elongate, narrow, quadrilateral. Ventral shields keeled; anal bifid. Posterior maxillary teeth not enlarged or grooved.

The genus *Dendrophis* has been formed to comprise those tree-snakes which combine an isodont dentition with an obtuse snout and enlarged, smooth vertebral scales. Three Indian species (*D. picta*, *formosa*, and *caudolineata*) and one from Australia (*D. punctulata*) have been referred to it*. On close examination, however, it will be found that they all differ from each other in the dentition. First, *D. formosa* has a truly "syncranterian" dentition, its hind tooth being strong and long; it therefore approaches that West-African form which I have described as *Rhamnophis*. In *D. picta* the maxillary teeth are subequal in size, but the lower jaw has two or three lengthened teeth anteriorly. *D. caudolineata* has two or three pairs of fang-like teeth above and below, and the last maxillary tooth is not enlarged. Finally, *D. punctulata* has no longer teeth anteriorly in either of the jaws, and the last maxillary tooth is not longer, but rather stronger, than the preceding.

Two species are found in British India:—

Scales in fifteen rows	<i>D. picta</i> .
Scales in thirteen rows	<i>D. caudolineata</i> .

* Dr. van Bleeker's collection of Indian Reptiles contains a *Dendrophis dumerilii*, which, however, is identical with *Xenelaphis hexahotus*. Although I am not aware that Dr. Bleeker has published a description of it, I would not omit to mention it here, as I may have overlooked the description.

DENDROPHIS PICTA.

Coluber pictus, *Gm. Syst. Nat.* i. p. 1116.

Russell, Ind. Serp. ii. tab. 25 & 26.

Coluber decorus, *Shaw, Zool.* iii. p. 538.

Leptophis maniar, *Bell, Zool. Journ.* ii. p. 329.

Ahætulla bellii, *Gray, Ind. Zool.* c. fig.

Dendrophis boii, *Cantor, Proc. Zool. Soc.* 1839, p. 53.

— *picta*, *Schleg. Phys. Serp.* ii. p. 228. pl. 9. figs. 5-7. *Günth. Colubr. Snakes*, p. 148.

Leptophis pictus, *Cantor, Mal. Rept.* p. 83.

Scales smooth, elongate, in fifteen rows, those of the vertebral series being considerably larger than the others, and sometimes of a hexagonal form. Ventral shields 160-187; anal bifid; subcaudals 100-156. Loreal narrow and elongate; one præocular, extending on to the upper surface of the head, but not reaching the vertical; two, sometimes three, postoculars; nine upper labials; maxillary teeth subequal in size; the two or three anterior teeth of the lower jaw distinctly longer than the others. Eye of moderate size. Bronze or brown above, sometimes with a yellow vertebral line on the front part of the trunk; a yellow band runs along each side, along the outer series of scales, and has a black or blackish edge either below, or above and below—the upper black margin being the continuation of a black band which commences behind the eye. Lower parts white or yellow.

This tree-snake is one of the most common species in almost every part of the East Indies. Variations occur not only in the coloration, but also in the form of the shields of the head and of the vertebral scales. In specimens from Siam the occipitals are obtusely rounded behind, in those from Ceylon somewhat pointed and divergent. The temporal shields vary much in number and shape.

Its food consists of lizards and frogs. When old it is rather ferocious and bites readily; it attains to a length of 4 feet, the tail being not quite one-third.

DENDROPHIS CAUDOLINEATA.

Ahætulla caudolineata, *Gray, Ind. Zool.* c. tab.

Leptophis caudolineatus, *Cantor, Mal. Rept.* p. 85.

Dendrophis octolineata, *Dum. & Bibr.* vii. p. 201.

— *picta*, *Motley & Dillwyn, Labuan*, p. 46.

— *caudolineata*, *Günth. Colubr. Snakes*, p. 150.

Scales smooth, elongate, in fifteen rows, those of the vertebral series scarcely larger than the others; those on the neck with a single apical groove. Ventral shields 183-188; anal bifid; subcaudals 105-110. Occipitals rounded behind. Loreal narrow, rather elongate; one præocular, extending on to the upper surface of the head, but not reaching the vertical; two postoculars. Nine upper labials, the fifth and sixth forming the lower part of the orbit. Temporals large, 2-4-2, the two anterior in contact with the oculars; there is generally a small piece detached from the lower anterior temporal, situated immediately behind

the lower postocular. The two or three anterior teeth in both jaws are elongate and much stronger than the following. Light brownish bronze, with two black bands running from a short distance behind the head along the lower part of the side to the tip of the tail. Four narrower black lines commence on the posterior half of the back, and terminate at the root of the tail, whence commences a single central black band. Pale yellow beneath; a black line along the middle of the lower surface of the tail.

This species is found at Pinang, Singapore, and in Borneo, and attains to a length of 5 feet, the tail being one-fourth.

CHRYSOPELEA, *Boie*.

Body and tail very elongate, slender, and compressed; back rounded; head depressed, oblong, with the snout obtusely rounded in front. Eye rather large, with round pupil; nostril lateral, between two nasals. Shields of the head regular (the loreal exceptionally confluent with the frontal); upper labials low. Scales not much elongate, rhombic, in fifteen or seventeen rows; the ventral shields have very sharp lateral keels, and appear to be formed of three pieces, separated by a notch in the hind margin; the lateral pieces are the smaller and erect; anal bifid. The maxillary is armed with a series of teeth subequal in size, and with a longer posterior tooth, which is grooved; the anterior mandibular teeth longer than the others.

With the exception of one West-African species, the others are East Indian; one or two of the latter inhabit British India:—

Scales smooth, in seventeen rows	<i>C. ornata</i> .
Scales smooth, in fifteen rows	<i>C. rubescens</i> .

CHRYSOPELEA ORNATA.

Russell, Ind. Serp. i. tab. 2.

Coluber ornatus, *Shaw, Zool.* iii. p. 477.

Chrysopelia ornata et *Ch. paradisi*, *Boie, Isis*, 1827, pp. 546, 547.

Dendrophis ornata, *Schlegel, Phys. Serp.* p. 234. pl. 9. figs. 8-10, & *Abbild.* p. 18. taf. 6.

Leptophis ornatus, *Cantor, Mal. Rept.* p. 87.

Chrysopelia ornata, *Dum. & Bibr.* vii. p. 1042. *Günth, Catal. Colubr. Snakes*, p. 146.

Dendrophis paradisi, *Molloy & Dillwyn, Labuan*, p. 46 c. fig. opt.

Scales smooth, with two apical grooves, broader on the back than on the sides, in seventeen

rows. Ventrals 180-236; anal bifid; subcaudals 96-147. Head black above, with yellow cross bands; body beautifully ornamented with regular yellow or black markings, the arrangement of which is subject to great variation.

Var. *a*. The black colour is predominant, each scale having a yellow central spot; the yellow bands on the head are numerous and frequently broken up into spots: I have seen specimens of this variety from Pinang, Sumatra, Borneo, and the Philippine Islands.

Var. *β*. The yellow colour is predominant, each scale being yellow with a narrow black edge and with a median black streak, the streaks forming longitudinal lines: Siam, Khasya, &c.

Var. *γ*. The black colour is predominant, each scale having a yellow central spot; these spots are larger on the back, forming a series of tetrapetalous flowers; five or six yellow cross bands on the head, some of which are broken up into spots: Malabar, Java, Borneo.

Var. *δ*. Much like var. *β*, but back with pairs of black cross bars; abdomen yellow, each ventral shield with a black lateral spot: Bengal, Khasya, Cochinchina, Anamallay Mountains, Ceylon.

Var. *ε*. Back red, with pairs of black cross bars, the bands of each pair being separated from each other by a narrow yellowish interval. Sides brown, with irregularly scattered black dots. Belly dark green, the outer portion of each ventral shield being yellow, with a blackish spot. A yellow, black-edged cross band between the hinder angles of the orbits; a similar band across the extremities of the occiput: Borneo. All these specimens are of small size*.

Var. *ζ*. Greyish olive, with narrow, serrated, equidistant black cross bands; head black above, with numerous yellow cross bands: two specimens from Ceylon are of small size and evidently immature.

It will be seen from the notes given above that this most beautiful of all snakes has a wide geographical range on the continent as well as in the Archipelago; but it appears to be limited to the tropical parts, as we have never received it from China nor from the Himalayas, except from Khasya. It attains to a length of more than 4 feet, the tail being one-fourth or rather more. Cantor says that it is but seldom seen in trees†; that it is more frequently found on the ground, in the grass, watching for lizards and frogs; that it differs from other tree-snakes in its being without the power of compressing and expanding the anterior part of the body, and in its gentleness. Dillwyn, on the other hand, describes the capture of one, clinging in a most extraordinary manner upon the trunk of a large tree, head downwards, and without any visible means of supporting itself; when it came down it climbed up another small tree with wonderful speed. I found geckoes in its stomach.

CHRYSOPELEA RUBESCENS.

Dipsas rubescens, Gray, *Ind. Zool.* c. 5g.

? *Leptophis rubescens*, Blyth, *Journ. As. Soc. Beng.* 1855, xliii. p. 293.

Chrysopelia rubescens, Günth. *Colubr. Snakes*, p. 145.

Scales smooth, narrow, with two apical grooves, in fifteen rows, those of the vertebral

* A specimen of this variety is called "*Chrysopelia hasseltii*" in Dr. P. v. Bleeker's collection.

† Probably because it makes too rapid a retreat to be seen.

series somewhat larger than the others. Ventrals 187-225, anal bifid; subcaudals 108-146. Rostral shield much broader than high; anterior frontals rounded in front, half as large as posterior. Vertical subtriangular, broad in front, narrow in the middle, with the lateral margins very concave; superciliaries convex, large; occipitals rounded behind; the two nasals are narrow, together as long as the loreal; one præocular, reaching to the vertical; two postoculars. Upper labials nine, the fourth, fifth, and sixth entering the orbit. Temporals 2+2+2; the two anterior the smallest, in contact with the oculars, the two posterior the largest. Each maxillary is armed with twelve teeth, the last of which is somewhat elongate and grooved; each mandible with three or four long teeth in front, and with a series of smaller ones behind. Purplish above and below, minutely dotted with brown, and with irregular black specks. Head with symmetrical brown longitudinal markings above; a brown streak from the nostril through the eye to the angle of the mouth. A very old specimen is nearly uniform greyish olive.

The occurrence of this species in British India is rather doubtful. The typical specimen from General Hardwicke's collection is said to be from Bengal, whence it has never been received since; on the other hand, specimens from Borneo perfectly agree with it. Mr. Blyth says that he has received it from Mergui; but as he attributes to it seventeen rows of scales, I doubt whether he has properly identified it. Other specimens have been received from the Philippine Islands. It appears also to occur in Sumatra, as we have received with Dr. P. v. Bleeker's collection a specimen named "*Dendrophis sumatrana*, Blkr." Their food appears to consist entirely of saurians (dragons, geckoes, &c.).

The typical specimen is 30 inches long, the tail measuring 9 inches; another, from the Philippines, is 48 inches long, tail 15 inches.

FAMILY OF WHIP-SNAKES—*DRYIOPHIDÆ*.

Body and tail generally excessively slender and elongate; head very narrow and long, with tapering snout, ending in a protruding rostral shield, which is sometimes modified into a flexible appendage. Mouth deeply cleft; nostril lateral, small; eye of moderate size, in all the Asiatic species with a linear, horizontal pupil. Shields of the crown of the head normal. Scales very narrow, much imbricate, in from fifteen to seventeen series; ventral shields without or with obsolete keels; subcaudals two-rowed. The Asiatic species have a long, fang-like tooth in the middle of the maxillary, and all are provided with a posterior grooved tooth.

The species of this family may be at once distinguished by their excessively slender body,

which has been compared to the cord of a whip, by their prevalent green colour with two white stripes on the belly, by their horizontal pupil, indicative of their nocturnal habits, and, finally, by their dentition. *Tropidococcyx* alone approaches the *Psammophides* by a stouter habit. Their movements are awkward on the flat ground, but extremely graceful and rapid in their natural haunts, among the branches of trees. Whilst they retain their hold with a few coils of the tail, their long body enables them to reach a distant branch, or to shoot forth to seize a remote prey, as birds, lizards, &c. They are numerous almost everywhere between the tropics. The Indian species belong to the following genera:—

Snout without appendage; loreal none	<i>Tropidococcyx</i> , p. 301.
Snout without appendage; loreal present	<i>Tragopa</i> , p. 302.
Snout with a flexible appendage	<i>Passerita</i> , p. 305.

TROPIDOCOCCYX, *Gthr.*

Body and tail rather slender, slightly compressed; head rather depressed, with pointed snout and sharp canthus rostralis; rostral shield not prolonged. Eye of moderate size, with horizontal pupil. Nostril small, lateral, in a single nasal. Shields of the head regular; loreal none. Most of the scales smooth, rather elongate, in fifteen rows; those of the vertebral series not enlarged. Ventral shields not keeled; anal bifid. The fourth or fifth maxillary tooth enlarged, the last grooved.

Only one species is known.

TROPIDOCOCCYX PERROTETI.

Psammophis perroteti, *Dum. & Bibr.* vii. p. 898.

Leptophis canariensis, *Jerdon, Journ. As. Soc. Beng.* 1855, xxii. p. 530.

Dryiophis tropidococcyx, *Günth. Colubr. Snakes*, p. 157.

Tropidococcyx perroteti, *Günth, Ann. & Mag. Nat. Hist.* 1860, vi. p. 428 c. fig.

The rostral shield is rather higher than broad, slightly convex, with the upper margin bent backwards. Anterior frontals small, bent downwards on the sides, in contact with the first and second upper labial shields; posterior frontals about three times as large as anterior, bent downwards on the side, in contact with the second upper labial. Vertical rather long, bell-shaped; occipitals much longer than broad, somewhat pointed behind, with a notch between the points. Nasal shield very narrow, simple, pointed behind; the small round nostril is in its hinder half. Loreal none, replaced by the frontals. Preorbital region deeply

concave, with a sharp superciliary and rostral ridge above. One præocular, in contact with the vertical; *a single postocular*. Eight upper labials, with a black-coloured groove above them; the first is exceptionally divided into two; when undivided it is larger than any of the three following; the fourth and fifth form the lower margin of the orbit. Temporal shields varying in number and size; only one is in contact with the postocular. Two pairs of chin-shields, the anterior rather longer than the posterior. Scales smooth, without apical groove, in fifteen rows; those on the end of the trunk are slightly keeled. Ventrals 138-140; anal bifid; subcaudals 70-82. Each maxillary is armed with twelve teeth, the fourth and fifth of which are enlarged, and the last two grooved; the four anterior teeth in each mandible are much longer than the others. Uniform grass-green; lower parts yellowish; a yellow streak along each side of the belly, edged with green interiorly.

Common in North Canara; it attains to a length of 24 inches, the tail measuring 5½ inches.

Judging by a figure in the possession of W. Elliott, Esq., the "*Leptophis? nilagiriensis*?", n. sp.," Jerdon, Journ. As. Soc. Beng. xxii. p. 529, would belong to this genus. The celebrated Indian ornithologist describes it thus: "Green above, yellow beneath; ventrals 140, subcaudals 73; thirteen rows of scales. Very common on the grassy hills of the Neelgherries." The figure mentioned does not show a lateral stripe on the belly.

TRAGOPS, *Wagl.*

Body and tail exceedingly slender, slightly compressed; head depressed, very long, with the snout long and pointed, but without rostral appendage; canthus rostralis sharp; loreal region concave. Eye of moderate size, with horizontal pupil; nostril small, lateral, situated in the hinder part of a single nasal shield. Shields of the head regular; loreal present. Scales smooth or faintly keeled, in fifteen rows, those of the vertebral series sometimes distinctly larger than the others. Ventral shields not, or slightly, keeled; anal bifid. The fourth, fifth, or sixth maxillary tooth enlarged, the last grooved.

I now know of three species of this genus, all occurring in British India:—

Rostral in contact with the frontals; ventral shields 200 or more *T. grasinus*.

Rostral in contact with the frontals; ventral shields about 150 *T. dispar*.

Rostral separated from the frontals by the nasals *T. fronticinctus*.

TRAGOPS PRASINUS.

Dryioplis prasina, (Reinw.) Boie, *Isis*, 1827, p. 543. *Schleg. Phys. Serp.* ii. p. 250. pl. 10. figs. 9-12, & *Abbild.* taf. 8. figs. 1-6. *Motley & Dillwyn, Labuan*, p. 47.

Dryinus nasutus, *Bell, Zool. Journ.* ii. p. 327.

Tragops nasutus, *Wagl. Syst. Amph.* p. 184.

Dryinus prasinus, *Cantor, Mal. Rept.* p. 81.

Tragops prasinus, *Dum. & Bibr.* vii. p. 824.

Scales smooth, in fifteen rows, those of the vertebral series considerably larger than the others. Ventrals 212-234; anal bifid; subcaudals 176-203. Rostral shield flat, subcrescentic, not extending on to the upper surface of the head, with a rather sharp ridge above. Both frontals much longer than broad; vertical bell-shaped, elongate behind; supraciliaries large, considerably broader than vertical; occipitals as long as vertical, rounded behind. Nasal simple, very long and narrow, pierced by the nostril posteriorly; from one to three loreals. Præocular single, deeply grooved, joining the vertical; two postoculars. Nine upper labials, the fourth, fifth, and sixth of which enter the orbit. Temporals irregular, generally two small ones in contact with the postoculars. The ground-colour is in some green, in others yellow, and, again, in others brown; all have a yellow or white line running along each side of the ventral shields; the young ones have a central ventral line besides.

The brown variety is rather scarce, and has been considered as a distinct species, *Tragops xanthozonius* (Russell, *Ind. Serp.* ii. pl. 24).

This species is very common in the East Indian archipelago and the western half of the continent, from Bengal to China; we have never received it from the peninsula of Southern India or from Ceylon. Motley and Dillwyn say that it haunts the thicker parts of the jungle where there is much low wood, and that it is very active. From its long and graceful form and the beauty of its colours, its movements are very elegant. Old examples are very ferocious; they prey on birds, lizards, frogs, and, when young, on insects. They attain to a length of more than 7 feet, the tail being rather more than one-third.

TRAGOPS DISPAR. (Plate XXIII. figs. A, A'.)

Scales smooth, without apical groove, in fifteen series; those of the vertebral line four sided, a little larger than those on the side, which are rather narrow, much imbricate, but not very long. Ventrals 151; anal bifid; subcaudals 100-105. Rostral shield rather flat, rather longer than broad, with its upper margin somewhat reflexed. Anterior frontals subtriangular, much longer than broad, bent downwards on the side, in contact with the second upper labial; posterior frontals longer than broad, rounded behind, not in contact with any of the labial shields. Vertical bell-shaped, elongate behind; occipitals as long as vertical, rounded and divergent behind. Superciliary and rostral ridge rather sharp. Nasal shield single, very narrow, pierced by the small, round nostril posteriorly; loreal small, always present; one large præocular, forming a broad suture with the vertical; two postoculars. Eight upper labials, the fourth and fifth of which form the lower part of the orbit; the

fourth is divided transversely into an upper and a lower portion. Temporals irregular in form and number; one is in contact with the postoculars. Two pairs of chin-shields, the posterior being rather longer than the anterior. The fifth maxillary tooth and the two anterior teeth of the mandible are prolonged. Males bright green, females bronze-coloured; skin between the scales black; a yellowish line with a greenish inner edge runs along each side of the abdomen.

We have received several specimens from the Anamallay Mountains through Captain B. H. Beddome; an adult female with mature eggs measures only 26 inches in length, the tail being 8 inches.

TRAGOPUS FRONTICINCTUS. (Plate XXIII. fig. E.)

Dryiophis fronticinctus, Günth. *Catubr. Snakes*, p. 158.

Scales on the back keeled, in fifteen rows, those of the vertebral series scarcely larger than the others. Ventrals 190; anal bifid; subcaudals 140. Rostral shield small, oblique, flat, semicircular, not extending on to the upper surface of the head. Nasal shield single, much elongate, pointed behind, and joining its fellow of the other side, so as to separate the rostral from the anterior frontals, forming a sort of frontlet; the nostril is in its hind part. Both frontals much longer than broad, the anterior pointed in front. Vertical bell-shaped, elongate; supraciliaries long, slightly arched; occipitals rather narrow. Two loreals; one (to three) præorbitals, reaching the vertical. Seven or eight upper labials; some of the anterior are always divided into two horizontal portions: in one specimen the two foremost are simple; the third, fourth, and fifth are divided, portions of the fifth forming additional præoculars; the sixth is very long, and forms the greater part of the lower edge of the orbit; the seventh and eighth elongate. Two postoculars; temporals irregular, small, always two in contact with the postoculars. Each maxillary is armed with ten widely-set teeth, the fourth of which is enlarged, the last being grooved; the two or three anterior teeth of each mandible much longer than the following. Uniform grass-green above, paler below, with a yellow band along each side of the belly.

Since the first publication of this species, I have ascertained that the collection, of which the typical specimens formed part, was not made in the West Indies (as was then believed), but in the East Indies, and as all the species contained in it belong to the fauna of British India, I cannot hesitate to admit it into this work, although I have never met with any other example, nor do I know from what part of the East Indies it came. The length of the longest of the three specimens is 36 inches, the tail measuring 10½ inches.

PASSERITA, Gray.

Body and tail exceedingly slender, slightly compressed; head depressed, very long, with the snout long, pointed, and terminating in a flexible appendage; præorbital region deeply concave, with a projecting edge above. Eye of moderate size, with horizontal pupil; nostril small, lateral, situated in the hinder part of a single nasal shield. Shields of the head regular; loreal none. Scales smooth, elongate, narrow, much imbricate, in fifteen rows, those of the vertebral series larger than those on the side. Ventral shields not keeled; anal bifid. Maxillary with a strong tooth in the middle and with a grooved tooth behind.

It is difficult to say whether the rostral appendage has to perform a function similar to that of the tentacles of *Herpeton*, which are presumed to serve as organs of touch, in the water or mud, without necessitating the exertion of the tongue and the opening of the mouth. In *Passerita*, which never enters the water, the tongue would appear to perform its function quite as perfectly as in other land snakes; moreover the rostral appendage of *Passerita* is covered with tough shields, and is consequently but slightly sensitive to touch.

Two species are known:—

- Belly with two yellow longitudinal bands *P. mycterizans*.
 Belly without bands *P. purpurascens*.

PASSERITA MYCTERIZANS.

? *Coluber mycterizans*, *L. Mus. Ad. Fried.* p. 28.

Russell, Ind. Serp. i. tab. 12, 13.

Dryinus nasutus, *Merr. Tent.* p. 136 (not Bell). *Dum. & Bibr.* vii. p. 809.

Passerita mycterizans, *Gray, Ann. Phil.* x. p. 208.

Dryiophis nasuta, *Schleg. Phys. Serp.* ii. p. 246. pl. 10. figs. 1-5.

Scales smooth, without apical groove, those of the vertebral series rather larger and broader than the others, in fifteen rows. Ventrals 172-188; anal bifid; subcaudals 140-166. The rostral appendage is formed by the rostral shield, which is prolonged, four-sided, folded; in young specimens it is curved upwards; the nasal shields also are prolonged and form a part of the lateral surface of the appendage, which is sometimes injured, when it is covered with small irregular shields; the whole length of the rostral shield equals one-half of that of the snout without appendage. Occipitals pointed and divergent behind. Loreal none, replaced

by the frontals, which are bent downwards and in contact with the labials. The single præocular forms a rather long suture with the vertical; two postoculars. Generally two upper labials form the lower edge of the orbit, the anterior of which is divided into an upper and a lower portion, and sometimes into three or even four. Bright grass-green, with a bronze shade on the back; on the anterior part of the trunk the skin between the scales is white or black, these two colours forming alternate cross bands when the animal expands that portion of the body; a yellow stripe runs along each side of the pale-green abdomen. Immature specimens show a pair of fine yellowish central lines along the abdomen.

Examples sometimes occur which are brownish-olive instead of green, but they retain the yellow abdominal bands; they are of small size, and have been named *Dryinus fuscus* (Dum. & Bibr. vii. p. 812).

We have received this snake only from Ceylon and from the peninsula of India; the other localities mentioned—Khasya, Sumatra, Java, Celebes, and the Philippine Islands—are more or less suspicious; at all events, it is much scarcer in those parts than in Western India: *Passerita mycterizans* and *Tragops prasinus* are supplementary species with regard to their geographical distribution. It attains to a length of more than 6 feet, the tail being rather more than one-third*; it appears to remain smaller in Ceylon, the largest specimen I have seen from that island being only 40 inches long. It feeds on birds and lizards, and its habits are the same as those of *Tragops prasinus*.

PASSERITA PURPURASCENS. (Plate XXIII. fig. F.)

Passerita mycterizans, var. *Dryinus fuscus*, Günth. *Colubr. Snakes*, p. 161 (not Dum. & Bibr.).

— *fuscus*, Cope, *Proc. Acad. Nat. Sc. Philad.* 1860, p. 554. *Tennent, Nat. Hist. Ceylon*, p. 307 c. fig.

Very similar to the preceding species. Scales smooth, without apical groove, those of the vertebral series rather larger and broader than the others, in fifteen rows. Ventrals 194; anal bifid; subcaudals 154. The rostral appendage is formed by the rostral shield, which is prolonged, four-sided, and verrucose on its upper surface; the length of the rostral shield is rather more than one-half of that of the snout without appendage. Occipitals small, pointed and divergent behind. Loreal none, replaced by the frontals, which are bent downwards and in contact with the labials. The single præocular reaches the vertical; two postoculars. Two upper labials below the orbit, the anterior divided into an upper and a lower portion, sometimes into three. Brownish grey, marbled with purple and dotted with brown, above and below; on the anterior dilatable part of the trunk the skin between the scales is white or black, these two colours forming alternate cross bands when the animal expands that portion of the body; no abdominal band. The shields of the upper surface of the head are brown, with broad yellowish edges; a brown band runs from the rostral appendage through the eye to the side of the neck.

* Specimen from Madras 67 inches long, tail 25 inches; another, 44 inches, tail 16 inches; a third, 15 inches, tail 5½ inches; specimen from Ceylon 40 inches, tail 14 inches.

This snake is peculiar to Ceylon; it is rare, attaining to a length of 4 feet, the tail measuring $1\frac{1}{2}$ foot.

It is a distinct species, and not *Dryinus fuscus* (Dum. & Bibr.) as I formerly believed; the latter being merely a variation of colour of *Passerita mycterizans*, having the yellow abdominal band, which is always absent in *P. purpurascens*. The latter has the rostral appendage always verrucose, and rather longer than in *P. mycterizans*.

FAMILY OF DIPSADES—*DIPSADIDÆ*.

Body much compressed, elongate or of moderate length; head short, generally broad behind, subtriangular, with rounded, short snout, distinct from neck; eye large, generally with vertical pupil; nostril lateral. Shields of the head regular; cleft of the mouth wide; lower jaw expansible, with a mental groove. Scales generally smooth, those of the vertebral series frequently enlarged. Maxillary bone and its teeth well developed: all the Indian species with a grooved fang behind; and several, moreover, with fangs in front.

The Indian Dipsades are nocturnal Tree Snakes with a vertical pupil, a short, broad head, and compressed, elongate body; some of them attain to the considerable length of 6 or 7 feet, and all live on warm-blooded animals; it is worthy of notice that some prey on birds only, whilst others attack nothing but mammals. Their coloration is much more varied than in the preceding family, and green but rarely forms the ground-colour, whilst brown and black prevail. The Indian Dipsades have congeners in Africa and Australia; we refer them to one genus.

DIPSAS.

Dipsas, auct.

Body and tail much elongate and compressed; head depressed, triangular, short, broad behind, very distinct from neck; snout short. Eye rather large, with vertical pupil; nostril between two nasals. Shields of the head regular; loreal present. Scales smooth, more or less narrow on the sides, those of the vertebral series dilated. Anal entire; subcaudals two-rowed. Posterior maxillary tooth grooved.

The species of this genus are very numerous, and found in each of the tropical regions. The following occur in British India:—

* *The anterior palatine and mandibular teeth are enlarged—considerably larger than the other teeth:*
EUDIPSA, Fitz.

Scales in twenty-three series *D. cynodon*, p. 308.

Scales in twenty-five or twenty-seven series *D. forsteni*, p. 309.

** *Palatine teeth not enlarged; scales moderately imbricate, in not very oblique series: thoroughly arboreal and chiefly feeding on birds:* DIRAAS, Gthr.

Body covered with brown and black dots and spots; eye very large *D. loops*, p. 309.

Black with yellow cross bands *D. dendrophila*, p. 310.

Uniform greenish above *D. bubalina*, p. 311.

A series of round brown spots along each side of the back *D. multimaculata*, p. 311.

*** *Anterior palatine and mandibular teeth but little enlarged; scales much imbricate, in very oblique series: living partly on the ground and feeding on small mammals:* DIPRADMORPHUS, Fitz.

Scales in twenty-one rows; vertebral scales somewhat larger than the others;

belly immaculate along the middle *D. trigonata*, p. 312.

Scales in twenty-one rows; vertebral scales somewhat larger than the others;

belly checkered with black *D. multifasciata*, p. 313.

Scales in twenty-one rows; vertebral scales subquadrangular, much larger

than the others *D. gokool*, p. 313.

Scales in nineteen rows *D. ceylonensis*, p. 314.

DIPSA CYNODON.

Dipsa cynodon, Cuv. *Règne Anim. Schleg. Phys. Serp.* ii. p. 268. pl. 11. figs. 10 & 11. *Cantor, Mal. Rept.* p. 77 (the adult specimen).

Eudipsa cynodon, (Fitz.) *Günth. Colubr. Snakes*, p. 168.

Paras waandersii, *Bleek. Nat. Tydschr. Nederl. Ind.* 1860, xx. p. 470.

Scales in twenty-three series, smooth, without apical groove, those of the vertebral series large, hexagonal. Ventrals 276–287; anal entire; subcaudals 141–162. The rostral shield has a deep impression in front, and is nearly as high as broad. Nostril a wide oblique slit. Loreal irregularly quadrangular, longer than high. One præocular, extending on to the upper side of the head, but not reaching the vertical. Two postoculars. Normally nine upper labials, the fourth, fifth, and sixth of which enter the orbit; sometimes one of the anterior labials is split into two, or two are united. The temporals vary in size and number; there are always two in contact with the postoculars. Two pairs of very broad chin-shields, the posterior being nearly twice as large as the anterior. The eight anterior lower labials are very narrow. Each maxillary is armed with about twelve slender teeth subequal in size, the last being grooved; three or four strong teeth on each palatine bone, the anterior being very long; eight small teeth occupy the anterior half of the pterygoid. Each mandible with about fourteen teeth, the first two very long. A black streak runs from the eye to the angle of the mouth; tail black, with irregular narrow white rings.

We have examined two very distinct varieties of coloration:—

Var. *a.* Blackish brown, dotted all over with black; indistinct rhombic black bands across

the back; belly entirely black or on the sides only; sometimes a series of distant flesh-coloured spots along each side of the belly:—males.

Var. β . Reddish- or yellowish-olive; back of the trunk with 35–36 rhombic, rather irregular black spots, extending downwards to the belly—the centre of each spot is the same as the ground-colour; belly uniform yellowish, or marbled with blackish or black:—females.

This species is found in the Malayan Peninsula, Java, Borneo, Bali, and the Philippine Islands; it attains to a length of 82 inches, the tail measuring 19 inches.

Cantor has confounded two species under the name of *D. cynodon*,—the young specimen described by him, and examined by myself, belonging to *D. gokool*, Gray.

DIPSAS FORSTENI.

Triglyphodon forsteni, *Dum. & Bibr.* vii. p. 1077.

Scales smooth, with a broad apical groove, in twenty-five or twenty-seven series, those of the vertebral series larger than the others. Ventrals 260–265; anal entire; subcaudals 106–131. Nostril rounded, immediately below the anterior frontal; hinder margin of the posterior nasal swollen, forming a rather prominent ridge; loreal as high as long; one preocular, extending on to the upper side of the head, but not reaching the vertical; two postoculars. Nine upper labials, the third, fourth, and fifth of which enter the orbit; the third sometimes split into two. Temporals rather numerous, varying in form; there are always three in contact with the postoculars. Two pairs of chin-shields, the anterior much larger than the posterior. Each maxillary is armed with ten equal teeth of moderate size and with a long grooved tooth behind; the two or three anterior teeth of the palatine and of each mandible are enlarged and much longer than the others. Brownish olive, many scales black at the base, the black spots forming rather broad transverse bands extending downwards on the sides; the lateral portions of these bands are frequently broken off, forming separate spots. Lower parts yellow, with more or less numerous blackish spots along each side. A longitudinal median black band along the occiput and the nape of the neck; a short black band along each side of the neck; another from the eye to the angle of the mouth.

This species, described from a specimen the origin of which is unknown, was discovered by Captain B. H. Beddome in the Anamallay Mountains; it attains to a length of 61 inches, the tail measuring 13 inches.

DIPSAS BOOPS. (Plate XXIV. fig. G.)

Dipsas fusca, *Motley & Dillwyn*, *Nat. Hist. Labuan*, p. 43 c. tab.

Dipsas boops, *Günth. Catubr. Snakes*, p. 170.

Body and tail very slender, much compressed; head thick, eye very large; nostril round, wide. Scales smooth, in twenty-one rows, those of the vertebral series large, hexagonal. Ventrals 265; anal entire; subcaudals 160. Loreal rather higher than long; one high

præocular, extending to, or nearly to, the vertical; two postoculars. Eight low upper labials, the third, fourth, and fifth very low, forming the lower part of the orbit. Temporals 2+2 or 2+3, the two anterior in contact with the postoculars. Two pairs of very broad chin-shields, the posterior smaller than the anterior; the first pair of lower labials are large, forming together a broad suture behind the mental shield; the other anterior labials are numerous, but narrow and small. Each maxillary is armed with ten teeth equal in size and with three posterior grooved teeth; palatine teeth not enlarged; the anterior mandibular teeth are rather larger than the others. Reddish olive, dotted and spotted with brown and black, the spots being numerous, forming longitudinal and transverse series; a series of white spots along each side of the belly; a black spot below each white one; belly marbled with purple and dotted with brown. Head symmetrically spotted with black, each black spot having a white edge.

This appears to be a very scarce species, as I have met with but one other example besides the two typical specimens from General Hardwicke's collection, which are said to be from Bengal. The larger is 57 inches long, the tail measuring 15 inches. Its stomach contained the remains of a bird. The third example mentioned is that figured by Motley and Dillwyn as *Dipsas fusca**, from Labuan, which specific name cannot be adopted, as it has been used for an Australian and for a West-African species of *Dipsas*. This Bornean specimen differs slightly from those from British India, having 240 ventral and 140 subcaudal shields. Whilst in the latter the posterior frontal is in contact with the loreal, both these shields are separated by the intervening nasal in the Bornean specimens.

The three views of the head on Plate XXIV. are taken from one of the typical specimens from Hardwicke's collection.

DIPSAS DENDROPHILA.

Dipsas dendrophila, (Reinw.) Wagl. *Syst. Amph.* p. 181, and *Icon.* taf. 8. Schleg. *Phys. Serp.* p. 263. pl. 11. figs. 1-3, and *Abbild.* taf. 45. Cantor, *Mal. Rept.* p. 76. Motley & Dillwyn, *Labuan*, p. 47. Günth. *Catubr. Snakes*, p. 169.

Triglyphodon dendrophilum et *gemmicineta*, *Dum. & Bibr.* vii. pp. 1086, 1091.

Scales in twenty-one series, smooth, with two narrow apical grooves; those of the vertebral series large, hexagonal. Ventrals 211-229; anal entire; subcaudals 90-112. Nostril round; loreal higher than long. One præocular, just reaching the upper surface of the head; two postoculars. Eight upper labials, the third, fourth, and fifth of which enter the orbit. The temporals vary in number and form, but there are always two in contact with the postoculars. Two pairs of chin-shields, the anterior being considerably larger than the posterior. Each maxillary is armed with twelve equal teeth of moderate size and with a posterior grooved tooth; palatine teeth not enlarged; anterior mandibular teeth rather longer than the others. Black, iridescent, with numerous (40-50-90) narrow yellow cross bands, broader below, and generally interrupted on the median line; occasionally they are reduced to lateral spots;

* This figure does not represent a *Dipsas trigonata*, as I formerly believed.

lips and throat yellow, each shield with a black margin; belly sometimes marbled with black, sometimes entirely black.

This fine species properly belongs to the fauna of the East Indian Archipelago, being found in all the larger islands; but it extends to the Malayan Peninsula, Singapore, and Pinang. It attains to the large size of 7 feet, the tail being rather less than one-fourth.

DIPSAS BUBALINA. (Plate XXIV. fig. E.)

Seba, ii. p. 87. tab. 83. fig. 1.

Vipera bubalina, *Klein, Tent. Herpet.* p. 21.

Triglyphodon cyaneum, *Dum. & Bibr.* vii. p. 1079.

Dipsas nigromarginata, *Blyth, Journ. As. Soc. Beng.* xxiii. p. 294.

Scales smooth, with a single apical groove, in twenty-one series, those of the vertebral series hexagonal. Ventrals 249-252; anal entire; subcaudals 124-134. Nostril round; loreal rather higher than long. One præocular, just reaching the upper surface of the head; two postoculars. Eight upper labials, the third, fourth, and fifth of which enter the orbit. The temporals appear to vary somewhat in arrangement, 3+3+3; only the two upper of the anterior are in contact with the oculars. Each maxillary is armed with ten or eleven teeth, which gradually become somewhat longer behind, the last grooved; palatine teeth not enlarged; the three or four anterior teeth of each mandible considerably longer than the following. Uniform green above; the skin between the scales and the inside of the mouth black. Lower parts uniform greenish olive.

This is a rare snake: a specimen in the Liverpool Museum is said to be from China. According to Blyth, it is an inhabitant of Assam. Our specimen is 53 inches long, the tail measuring 14 inches.

Mr. Blyth mentions a small snake obtained "in the neighbourhood" (of Calcutta?), 18 inches long, and names it *Dipsas hexagonotus* (*Journ. As. Soc. Beng.* 1856, xxiv. p. 360); "it was bright ruddy ferruginous, inclining to coral-red; paler below, and mottled with black bordering some of the scales of the upper parts. Head green, throat white; a slight blackish occipital streak. Ventrals 247; subcaudals 126; series of scales 21." Mr. Blyth adds that "it probably grows to a large size, and may become wholly green." If this be the case, how does it differ from *D. bubalina*, which has been named *D. nigromarginata* by the same author?

DIPSAS MULTIMACULATA.

Russell, Ind. Serp. ii. tab. 23.

Dipsas multimaculata, *Schlegel, Phys. Serp.* ii. p. 265. pl. 11. figs. 4 & 5, and *Abbild.* taf. 45. figs. 13-15. *Cantor, Mal. Rept.* p. 76.

Scales in nineteen, sometimes in seventeen series, smooth, with a narrow apical groove:

those of the vertebral series large, hexagonal. Ventrals 202-235; anal entire; subcaudals 80-106. Nostril round; loreal rather higher than long. One preocular, not extending on to the upper side of the head; two postoculars. Eight upper labials, the third, fourth, and fifth of which enter the orbit. The temporals vary in form and arrangement. Two pairs of chin-shields, the anterior being rather longer than the posterior. Four labials are in contact with the front chin-shields. Each maxillary is armed with ten rather small teeth equal in size and with a posterior grooved tooth; palatine teeth not enlarged; anterior mandibular teeth rather longer than the others. Reddish olive, with a series of round brown spots, lighter in the centre and edged with white along each side of the vertebral line; another series of smaller spots along the side; belly white, marbled or spotted with brown. A brown streak runs from the eye to the angle of the mouth; a Δ -like mark of the same colour on the head, its point resting upon the forehead; nape of the neck with a round or ovate brown, white-edged spot.

This species is found in Bengal, Tenasserim, the Malayan Peninsula, at Pinang, in Siam, Java, Celebes, and China; it attains to a length of $2\frac{1}{2}$ feet, the tail being one-fifth. I have found the remains of birds in the stomach.

DIPSAS TRIGONATA.

Russell, Ind. Serp. i. tab. 15.

Coluber trigonalis, Schneid. in Bechst. Uebers. Lacép. iv. taf. 40. fig. 1.

Dipsas trigonata, Boie, Isis, 1827, p. 559. Schleg. Phys. Serp. ii. p. 267. pl. 11. figs. 6 & 7.

Dipsadomorphus trigonatus, (Fitz.) Günth. Colubr. Snakes, p. 175.

Scales smooth, in twenty-one (exceptionally in nineteen) series, those of the vertebral series distinctly larger than the others. Ventrals 235-269; anal entire; subcaudals 79-87. Nostril rather small, rounded. Loreal as high as long; one preocular, just reaching the upper surface of the head; two postoculars. Eight upper labials, the third, fourth, and fifth of which enter the orbit. Temporals varying in form, number, and arrangement. Each maxillary is armed with ten small teeth and with a pair of grooved posterior teeth; the two anterior teeth of the palatines and of each mandible are somewhat larger than the others. Yellowish olive, with a rather irregular white or yellow zigzag band along the back, edged with black; crown of the head with two dark bands edged with black, convergent behind; an indistinct brown band from the eye towards the angle of the mouth. Belly white, with an irregular series of brown dots along each side.

This is a common species in the peninsula of Southern India, extending to Bengal and to the foot of the Himalayas, and attains to a length of about 3 feet, the tail being one-fourth. It feeds on mice.

DIPSAS MULTIFASCIATA.

Dipsas multifasciata, Blyth, *Journ. As. Soc. Beng.* 1861, xxix. p. 114.

A specimen, of unknown origin, very closely allied to *D. trigonata*, has been considered by myself as a variety of that species, and is mentioned as var. B. in the 'Colubrine Snakes,' p. 175. A second specimen of this snake appears to have been observed by Blyth, and as he has assigned to it a specific name, we record it as a separate species, the validity of which still requires further confirmation.

It agrees in every respect with *D. trigonata* but in coloration: its natural ground-colour is brown, and grey after the loss of the epidermis; some scales along and near the vertebral series yellow or black; other scales on the sides are black, forming narrow, irregular vertical streaks, about seventy-five in number; the lower parts are checkered with black. Two temporals are in contact with the postoculars. Ventrals 247; subcaudals 106.

Blyth's specimen was captured at Subathoo; ours is 25 inches long, the tail being one-fifth of the total length.

DIPSAS GOKOOL.

Dipsas gokool, Gray, *Ind. Zool. c. fig.*

— *cynodon*, Cantor, *Mal. Rept.* p. 77 (the young specimen).

Scales smooth, in twenty-one series, those of the vertebral series much enlarged, subquadrangular. Ventrals 224-225; anal entire; subcaudals 87-94. Nostril of moderate size, round. Loreal square; one preocular, sometimes divided into two, not extending to the upper surface of the head; two postoculars. Eight upper labials, the third, fourth, and fifth of which enter the orbit. Temporals 2+3+3; the upper of the anterior ones is in contact with the oculars. Each maxillary is armed with about ten teeth, which gradually become somewhat longer behind, and with two posterior grooved teeth; the teeth of the palatine bones and the three anterior of the lower jaw are a little longer than the following. Yellowish brown: head with an arrow-shaped brown, black-edged mark, longitudinally divided into two by a yellow line; its point rests on the anterior frontals; a rounded black spot on the nape, between the two barbs of the arrow-shaped mark; a black streak runs from the eye to the angle of the mouth; a straight yellow vertebral line; on each side of the trunk a series of about fifty black erect Y-shaped marks; lower parts yellowish, with an irregular series of brown spots along each side.

Having now seen two specimens of this snake which are perfectly alike, viz. the typical specimen of *D. gokool* and that of *D. cynodon* (young), Cantor, I cannot hesitate to consider it as a valid species, distinguished from *D. trigonata* by large vertebral scutes and by a peculiar coloration. It is scarce at Pinang and in Bengal. The larger specimen is 33 inches long, the tail measuring 7 inches; it had fed on a mouse.

DIPSAS CEYLONENSIS. (Plate XXIII. fig. B.)

Dipsadomorphus ceylonensis, *Günth. Colubr. Snakes*, p. 176.

Scales smooth, without apical groove, in nineteen series; those of the vertebral series large, hexagonal. Ventrals 220; anal entire; subcaudals 108. Nostril of moderate size. Loreal square; one præocular, just reaching the upper surface of the head; two postoculars. Eight upper labials, the third, fourth, and fifth of which enter the orbit. Temporals numerous, scale-like; two are in contact with the postoculars. Each maxillary is armed with ten teeth of moderate size and with a grooved posterior tooth. Palatine teeth not enlarged; the anterior mandibular teeth are a little longer than the following. Greyish olive, minutely punctulated with black; a vertebral series of more or less rounded blackish-brown spots, each emitting an oblique narrow streak towards the sides of the belly; belly finely marbled with brown, with a series of brown spots along each side. A black blotch on the occiput; a brown streak runs from the eye to the angle of the mouth.

The representative of the continental *D. trigonata* in Ceylon; it attains to a length of 37 inches, the tail measuring 9 inches. It feeds on mice.

FAMILY OF LYCODONTES—*LYCODONTIDÆ*.

Body generally of moderate length or rather slender, rounded or slightly compressed; head of moderate length and width, generally with depressed, flat, and elongate muzzle. Eye rather small, generally with vertical pupil. Shields of the crown of the head regular, with the posterior frontals enlarged. Maxillary with a fang in front, but without a posterior grooved tooth.

The Indian species, having a vertical pupil, would appear to be nocturnal snakes; yet they feed exclusively on skinks, which they must catch during the day, if they do not follow them into the places of their retreat. The African *Lycodontes* feed on mice and other small nocturnal mammals. They are ground-snakes, and some of the species are extremely numerous in British India; they belong to the following genera:—

Scales smooth; loreal present; two nasals	<i>Lycodon</i> , p. 315.
Scales smooth; loreal none	<i>Tetragonosoma</i> , p. 320.
Scales smooth; nasal single	<i>Leptorhylaon</i> , p. 321.
Scales keeled; subcaudals bifid	<i>Ophites</i> , p. 322.
Subcaudals entire	<i>Cercaspis</i> , p. 323.

LYCODON.

Lycodon, sp., *Boie*.

Body and tail of moderate length, slightly compressed; generally a slight ridge along the side of the belly and tail. Head depressed, with flat, obtuse snout, distinct from neck. Number of ventrals between 150 and 250. Nostril between two shields. Shields of the head regular; loreal present; one or two præ- and two post-oculars. Scales smooth, in seventeen rows. Subcaudals two-rowed; anal entire or bifid. Pupil elliptical, erect. Maxillary with one of the anterior teeth enlarged, there being a toothless space behind it; posterior maxillary tooth enlarged, not grooved; anterior mandibular teeth longer than the following; palatine teeth not enlarged.

This genus is entirely composed of Indian species, the following occurring on the continent:—

- * *One loreal, not entering the orbit.*
 The præocular is in contact with the vertical; posterior frontals longer than broad *L. aulicus*, p. 316.
 The præocular is in contact with the vertical; posterior frontals scarcely longer than broad. Black, with white cross bands *L. laocensis*, p. 317.
 The præocular is not in contact with the vertical; ventrals ca. 170 *L. striatus*, p. 318.
- ** *Two loreals.*
 Anal entire *L. anamallensis*, p. 318.
- *** *The loreal enters the orbit.*
 Anal entire *L. rufozonatus*, p. 319.

Note.—LYCODON SUBPUNCTUS (Cantor, Proc. Zool. Soc. 1839, p. 50), from Bengal, remains an uncertain species for the present. The typical specimen has been lost; and the figure of it, preserved in the Museum of the University of Oxford, does not show sufficient details to enable us to give a description of it. It would appear from that figure that it has only one præ- and one post-ocular, nine upper and ten lower labials. Cantor himself characterizes the species thus:—"Light brown; yellowish white beneath. Ventrals 245; subcaudals 78."

LYCODON AULICUS.

Coluber aulicus, *L. Syst. Nat.* i. p. 381. *Russell*, ii. pl. 39*.

Lycodon aulicus, *Boie, Isis*, 1826, p. 981. *Cantor, Catal.* p. 68.

— *hebe*, *Schleg. Phys. Serp.* ii. p. 106. pl. 4. figs. 1-3 (not *C. hebe*, *Daud.*).

Note.—The synonymy in all the preceding herpetological works is confused—*C. striatus*, *C. malignus*, *C. hebe*, *C. fasciolatus*, and probably *C. capucinus* belonging to other species.

Snout broad, much depressed, long, spatulate, with the upper lip swollen, and without canthus rostralis. Rostral shield very low, broad, slightly bent backwards on the upper surface of the snout; anterior frontals very small; posterior frontals longer than broad, much more so in adult specimens than in young ones; there is a lateral notch between the anterior and posterior frontals, in which the inner anterior angle of the loreal is received; the posterior frontals have an obtuse lateral angle corresponding to the suture between two nasals, the anterior of which is situated on the foremost part of the snout. Loreal single, large, nearly twice as long as broad. Preocular single, in contact with the vertical and with the third labial; specimens in which it does not reach the vertical are very scarce. Two postoculars; supraciliary rather small. Nine upper labials, the third, fourth, and fifth of which enter the orbit. Temporals numerous, scale-like. Scales smooth, with a minute apical groove, in seventeen rows. Abdomen and tail with an angular ridge on each side. Ventrals 183-209; anal bifid, in a few specimens entire; subcaudals 57-77†. Each maxillary is armed with two fangs in front, placed in a transverse line, the outer being much larger than the inner; the lateral longitudinal series of teeth commences at some distance from the fangs; they are small, from four to twelve in number, the last being considerably larger than the others; pterygoido-palatine teeth small, of equal size; mandible with two or three fangs on each side and with a series of small teeth. Coloration variable.

I. *Continental varieties*. The posterior frontals are moderately elongate—in young specimens nearly as broad as long. Each upper labial with a brown spot. [To this category belong also specimens from the Philippine Islands.]

Var. *a*. *Russell*, ii. pl. 39. Uniform brown above, without collar: Malayan peninsula, Bengal, Madras.

Var. *β*. Uniform brown above, with a white collar: Madras.

Var. *γ*. Brown or greyish brown, with indistinct traces of a white network, and with a white collar, more distinct in young specimens than in old ones: Coast of Malabar, Pinang, Malayan Peninsula, Gamboja, Philippine Islands, Timor.

Var. *δ*. Ferruginous or chestnut-brown, with white, brown-edged cross bars on the back,

* We can quote only this figure to this species; others, as i. pl. 16, or pl. 21, belong to quite different snakes.

† Specimen from Ceylon	185 + 64.
„ Ceylon	190 + 65.
„ Ceylon	192 + 57.
„ Madras	183 + 72.
„ Nepal	207 + 78.

Specimen from Pinang	209 + 60.
„ Gamboja	201 + 70.
„ Philippines	199 + 77.
„ Philippines	185 + 65.

which are sometimes bifid on the sides, the branches of one band joining a branch of the preceding and following bands. The first band forms a collar; those on the hind part of the body gradually become indistinct. This variety is very common, and similar to, but specifically distinct from, the snake figured by Russell (i. pl. 16): we have received it from Pinang, Bengal, Nepal, Kangra (Himalayas), the Dekkan, and the Anamallay Mountains.

11. *Ceylonese varieties.* The posterior frontals are much elongate, much longer than broad in every age. Upper labials white or shaded with brown.

Var. *e.* Uniform brownish grey above.

Var. *f.* Brown, with three or four broad, distant, white cross bands on the anterior half of the body; the anterior forms a collar, the others being broadest on the sides.

Var. *g.* Brown or greyish, with pure-white or reticulated white cross bands extending downwards to the belly, where they are broadest.

This is one of the most common snakes of the Indian continent and of Ceylon; it does not extend northwards to China, and becomes scarcer on the coasts of the south-eastern parts of India; it occurs in only a few of the islands—in the Philippines and in Timor; it is not certain whether the Javan form is specifically the same. It attains to a length of more than 2 feet, the tail being one-sixth. It is one of the most formidable enemies of the skinks, which form almost its sole food, the fangs in front of its jaws being admirably adapted for piercing and making good its hold on the hard smooth scales with which those lizards are coated. It is of fierce habits and defends itself vigorously.

LYCODON LAOENSIS.

Snout broad, much depressed, short, with the upper lip not swollen and without canthus rostralis. Rostral shield moderately depressed, not twice as broad as high, slightly bent backwards on the upper surface of the snout; anterior frontals rather small, not quite half as large as posterior, obtusely rounded in front, as long as broad; posterior frontals scarcely longer than broad; vertical of moderate length and width; supraciliary small; occipitals not much elongate, rounded behind. Nostril small, directed upwards, between two nasals, the anterior of which is situated on the foremost part of the snout. Loreal single, large, nearly twice as long as broad. Præocular single, in contact with the vertical and with the third labial; two postoculars. Nine upper labials, the third, fourth, and fifth of which enter the orbit. Temporals numerous, scale-like. Scales smooth, with a minute apical groove, in seventeen series. Abdomen and tail with a distinct angular ridge on each side in the male, indistinct in the female. Ventrals 185; anal bifid; subcaudals 68. Dentition as in *L. aulicus*. Deep black above, with pure-white cross bands: the first cross band forms a collar; those on the anterior half of the trunk are distant, five in number, widening below, so that the ground-colour appears in very large rounded patches; the cross bands on the posterior half of the trunk and on the tail are closer and narrower. Lower parts uniform white.

Two specimens from the Laos Mountains, a male and female, are perfectly alike, and having a considerably shorter and narrower snout than *L. aulicus*, this character, combined

with the peculiar coloration, appeared to me to indicate a specific difference. The male is $16\frac{1}{2}$ inches long, the tail measuring $3\frac{1}{2}$ inches. A third specimen has been purchased, and is said to be from Siam.

LYCODON STRIATUS.

Russell, Ind. Serp. i. pl. 16.

Coluber striatus, Shaw, Zool. iii. p. 527.

— *malignus, Daud. Rept. vii. p. 46.*

Snout much depressed, rather broad, of moderate length, with the upper lip not swollen, and without canthus rostralis. Rostral shield low, not quite twice as broad as high, slightly bent backwards on the upper surface of the snout. Anterior frontals rather small, half as large as posterior, obtusely rounded in front, as long as broad. Posterior frontals as broad as long; vertical of moderate size, not elongate; occipitals of small size, scarcely longer than vertical, rounded behind. Nostril small, lateral, between two nasals. Loreal single, twice as long as high; præocular narrow, single, in contact with the third labial, but not with the vertical; two postoculars. Eight upper labials, the third, fourth, and fifth of which enter the orbit. Temporals scale-like, generally 2+3, the anterior in contact with the postoculars. Dentition similar to that of *L. aulicus*. Scales smooth, with a minute apical groove, in seventeen rows. Abdomen and tail without lateral ridge. Ventrals 167-174; anal bifid; subcaudals 46-48. Black or brown, with or without a whitish collar; body and tail with white cross bands, which are sometimes bifid on the sides, sometimes reduced to a vertebral series of white spots.

This species appears to be confined to the peninsula of India; we have received it lately from the Anamallay Mountains and from the Madras Presidency; it does not grow to the same size as *L. aulicus*, the largest specimen I have seen being less than 2 feet, tail one-sixth of the total length.

LYCODON ANAMALLENSIS.

Snout of moderate width, rather depressed, scarcely longer than broad, with the upper lip not swollen, and with a very obtuse canthus rostralis. Rostral shield very low, twice as broad as high, slightly bent backwards on the upper surface of the snout. Anterior frontals square, not rounded in front, half the size of posterior; posterior frontals rather longer than broad. Vertical not much elongate; occipitals rather narrow, rounded behind, of moderate length. Two loreals on each side; nostril lateral; præocular scarcely touching the vertical; two postoculars; supraciliary of moderate size. Nine upper labials, the third, fourth, and fifth of which enter the orbit. Temporals numerous, scale-like. Scales smooth, in seventeen rows, a minute apical groove being visible in only a few scales. Abdomen and tail with an angular ridge along each side. Ventrals 202; anal entire; subcaudals 74. Each maxillary

is armed with twelve teeth—the third on each side being enlarged, situated in front of the mouth; there is an interval behind it, and the last again is a little enlarged; mandible with a fang anteriorly. Greyish brown, with about twenty-five small, white, brown-edged cross bars on the back of the trunk; sides indistinctly reticulated with whitish; no collar; each labial with a brown spot. Lower parts uniform white.

A single specimen was brought by Captain B. H. Beddome from the Anamallay Mountains; it is 20 inches long, the tail measuring $3\frac{1}{2}$ inches.

LYCODON RUFOZONATUS.

Lycodon rufozonatus, Cantor, *Ann. & Mag. Nat. Hist.* 1842, ix. p. 483.

Coronella striata, Hallowell, *Proc. Acad. Nat. Sc. Philad.* 1856, p. 152.

Eumesodon striatus, Cope, *ibid.* 1860, p. 263.

Head broad, depressed, triangular, with rather short and rounded snout; upper lip not swollen, canthus rostralis rounded. Rostral shield of moderate size, somewhat broader than high, slightly bent backwards on the upper surface of the head. Anterior and posterior frontals broader than long, the former not quite half the size of the latter. Vertical broad anteriorly; occipitals of moderate size, rounded behind. Nostril lateral, between two nasals; loreal elongate, entering the orbit; a small preorbital above, which does not extend to the upper surface of the head; two postoculars; supraciliary of moderate size. Eight upper labials, the third, fourth, and fifth entering the orbit. Temporals rather irregularly arranged, the two anterior being elongate and in contact with the oculars. Scales smooth, in seventeen rows, with a pair of minute grooves. Abdomen and tail with an angular ridge along each side. Ventrals 193–201; anal entire; subcaudals 72–75. Each maxillary is armed with a lateral series of about eight teeth, the third and last of which are somewhat longer than the others; the third is not placed quite at the front part of the mouth, but more backwards on the side; there is a free interspace behind it. The three or four anterior mandibular teeth are rather longer than the following. Crimson above, dotted and speckled with brown, and with about eighty broad brown cross bands, twice as broad as the interspaces, not extending downwards to the belly; sides and lower parts of the tail with brown spots; belly yellowish. Each shield on the upper side of the head brown with yellowish margin; a brown band runs from the eye to the angle of the mouth; an oblique crimson band on each side of the neck.

This is rather a stout species, found on the Chinese island of Chusan; it attains to a length of 40 inches, the tail measuring $5\frac{1}{2}$ inches. The typical specimens of *Coronella striata* are said to be from Ningpo.

TETRAGONOSOMA, *Gthr.*

Body and tail of moderate length, compressed, with rounded back and angular belly. Head depressed, of moderate length, with rounded snout, distinct from neck. Ventrals more than 200, angularly bent on each side. Nostril between two shields. Shields of the head regular: loreal none, replaced by posterior frontal; one ante-, three (two) post-oculars. Scales smooth, without apical groove, in seventeen rows. Subcaudals two-rowed. Pupil elliptical, erect. Maxillary with one of the anterior teeth (third) enlarged, there being a toothless space behind it; palatine teeth not enlarged; mandible with a fang in front.

Body with broad buff-coloured rings *T. effrene*.
 Body marbled with white and black *T. atropurpureum*.

TETRAGONOSOMA EFFRENE. (Plate XXIV, fig. K.)

Lycodon effrenis, Cantor, *Mal. Rept.* p. 70. fig. 2 (not good).

Tetragonosoma effrene, Günth. *Colubr. Snakes*, p. 253.

Lycodon ophiteoides, Bleek. *Nat. Tijdschr. Nederl. Ind.* xvi. p. 436.

Rostral shield much broader than high, scarcely extending to the upper surface of the head; anterior frontals nearly square, one-fourth the size of posterior; posterior frontals bent downwards on the sides, in contact with the second and third labials, as broad as long. Vertical rather elongate; occipitals rounded, and not separated by a notch behind. One preocular, just reaching to the upper surface of the head; three postoculars, the lower of which is sometimes confluent with the fifth labial. Nine upper labials, the third, fourth, and fifth of which enter the orbit, the four posterior very small. Temporals numerous, scale-like. Ventrals 215-228; anal entire; subcaudals 72-101. Black above and below; throat, lips, and a band along each side of the upper part of the head buff-coloured. Eleven distant rings of the same colour encircle body and tail in the young, but the posterior become indistinct with age, so that only the three or four anterior remain visible.

The typical specimen was found on the Great Hill of Pinang; it is 12½ inches long, the tail measuring 2¼ inches. We have seen only one other specimen, the type of *Lycodon ophiteoides* of Bleeker; this is from Sinkawang (Borneo), and is 27 inches long, the tail measuring 6¼ inches. We have given two views of the head of the Pinang specimen, of the natural size.

TETRAGONOSOMA ATROPURPUREUM.

Lycodon atropurpureus, Cantor, *Proc. Zool. Soc.* 1839, p. 50.

The typical specimen, with a drawing, was deposited by Dr. Cantor in the Radcliffe Library, Oxford; the former has been lost; and as the species has not been rediscovered hitherto, we can add but little information from an examination of the figure.

Cantor's diagnosis is limited to the following words:—"Deep purple, marbled with white and black; beneath pearl-coloured. Ventrals 257; subcaudals 91."

The loreal shield is absent, so that the frontals come into contact with the labials. One præ- and two post-oculars. Occipitals very long and tapering; upper labials nine, the fourth and fifth (and perhaps the third) entering the orbit. Cantor has also figured the dentition, which perfectly agrees with that indicated in the diagnosis of this genus.

Mergui.

LEPTORHYTAON, *Gthr.*

Body of moderate length, rounded, not compressed; tail short; head depressed, of moderate length, with rounded snout, distinct from neck. Ventrals less than 200, not bent on the sides. One nasal shield, pierced by the nostril; loreal elongate, pointed behind, but scarcely coming into the orbit. One præocular, situated above the loreal; two postoculars. Scales smooth, with a minute apical groove, in seventeen series. Subcaudals two-rowed. Pupil elliptical, erect. Maxillary with a fang in front of the mouth, a toothless space behind it; a series of small teeth on the side, the last being stronger than the others. Palatine teeth not enlarged. Mandible with one or two fangs in front.

Only one species is known.

LEPTORHYTAON JARA.

Jara-potoo, Russell, *Ind. Serp.* i. pl. 14.

Coluber jara, Shaw, *Zool.* iii. p. 525.

— *bipunctatus*, Cantor, *Proc. Zool. Soc.* 1839, p. 52.

Lycodon jara, Schleg, *Phys. Serp.* ii. p. 110.

Leptorhytaon jara, Günth. *Colubr. Snakes*, p. 205.

Rostral shield rather broader than high; anterior frontals small, pentagonal, one-third the

size of posterior, as long as broad; posterior frontals pentagonal, of moderate size, as long as broad; vertical and occipitals of moderate size, the latter rounded and not notched behind. The single præocular reaches just to the upper surface of the head. Nine upper labials, the third, fourth, and fifth of which enter the orbit; the four posterior are higher than long. Temporals small, scale-like, rather irregularly arranged, one being in contact with the post-oculars. Ventrals 167-175; anal bifid; subcaudals 56-63. Brown above, each scale with two white dots; generally a white collar; lower parts uniform white.

Russell received his specimen from Ganjam; ours is from the Anamallay Mountains; according to Cantor it occurs also in Bengal and Assam. Our largest specimen is 16½ inches long, tail 2½ inches.

OPHITES, *Wagler*.

Body and tail rather slender, compressed, with an angular ridge along each side of the belly and tail. Head depressed, with flat, obtuse snout, distinct from neck. Ventrals about 200 or more, angularly bent on each side. Nostril between two shields. Shields of the head regular: in one species præocular absent. Scales keeled, in seventeen rows. Subcaudals two-rowed. Pupil elliptical, erect. Maxillary with one of the anterior teeth (third or fourth) enlarged, there being a short toothless space behind it; last maxillary tooth and palatine teeth not enlarged; mandible with a fang in front.

Two species are known:—

Loreal entering the orbit; præocular absent *O. subcinctus*.
A præocular between loreal and orbit *O. albofuscus*.

OPHITES SUBCINCTUS.

Russell, Ind. Serp. ii. pl. 41.

Coluber platurinus, Shaw, Zool. iii. p. 468*.

Lyodon subcinctus, Boie, Isis, 1827, p. 551. *Schleg. Phys. Serp.* ii. p. 117. pl. 4. figs. 14 & 15.

— *platurinus, Cantor, Mal. Rept.* p. 69.

Ophites subcinctus, Wagl. Syst. Amph. p. 186.

Scales in seventeen rows, those on the back slightly keeled. Ventrals 198-221; anal

* As it was impossible to recognize this species from Shaw's description, the name proposed by him has no claim to priority.

bifid; subcaudals 60-82. Vertical not much longer than broad. Nostril wide, situated between the two nasals, the anterior frontal, and first labial. Loreal rather elongate; no præocular; two postoculars; nine upper labials, the third, fourth, and fifth entering the orbit. Temporals 1+2+2. Black, paler on the sides and below, with a varying number of broad, distant white or whitish bands which become broader below; they are more distinct and more numerous in young specimens than in adult ones, in which those on the hinder part of the body entirely disappear. The first band forms a collar extending on to the lips, but frequently disappears with age.

This is a Javan species, extending to Pinang, where it is very scarce. It attains to a length of $3\frac{1}{2}$ feet, the tail being one-fourth or one-fifth of the total length. It feeds on skinks and is of fierce habits, like the other *Lycodontides*.

OPHITES ALBOFUSCUS.

Sphæcodes albofuscus, *Dum. & Bibr.* vii. p. 394.

Ophites albofuscus, *Günth. Colubr. Snakes*, p. 207.

Scales in seventeen rows, strongly keeled. Ventrals 256; anal bifid; subcaudals 204-208. Anterior frontals short, much broader than long; vertical five-sided, as broad as long. Nostril wide, situated between the two nasals, the anterior frontal, and first labial. Loreal as high as long; one præocular, just reaching the upper surface of the head; two postoculars; eight upper labials, the third, fourth, and fifth entering the orbit. Temporals rather irregularly arranged: two in front rather elongate and in contact with the postoculars; another, of elongate form, is situated on the side of the hinder half of the occipital. Light reddish, with numerous (about fifty) brown cross bands, which are twice or thrice as broad as the intervals of the ground-colour; a reddish-white collar.

Duméril states that the single typical specimen came from Sumatra; his description agrees with our specimen as accurately in every point as if it had been taken from it; I, however, count 204 subcaudals, whilst Duméril states 208. It was purchased of a Paris dealer, who stated that it came from the coast of Malabar; it is $24\frac{3}{8}$ inches long, the tail measuring $8\frac{1}{2}$ inches.

CERCASPIS, *Wagl.*

Body of moderate length, strongly compressed; tail rather short. Head rather depressed, flat above, with rounded snout of moderate length, not very distinct from neck. Ventrals not quite 200 in number, with a strong angular ridge on each side; subcaudals simple. Shields of the head regular. Scales strongly keeled, in nineteen series. Pupil elliptical, erect. Maxillary with one of the anterior teeth (third or fourth) enlarged, there being a toothless

space behind it ; the last maxillary tooth is larger than the preceding, and separated from them by an interspace. Palatine teeth not enlarged ; the anterior mandibular teeth are not much larger than the following.

Only one species, from Ceylon, is known.

CERCASPIS CARINATA.

Hurria carinata, Kuhl, *Beitr. Zool.* p. 95.

Cercaspis carinatus, Wagl. *Syst. Amph.* p. 191.

Lycodon carinatus, Schleg. *Phys. Serp.* ii. p. 109. pl. 4. figs. 6 & 7.

Anterior frontals small, not quite one-third of posterior ; loreal rather longer than high ; præocular just reaching the upper surface of the head ; two postoculars ; eight upper labials, the third, fourth, and fifth entering the orbit. Temporals 2+3+3, the two anterior in contact with the postoculars, that situated at the side of the extremity of the occipital enlarged. Ventrals 188-193 ; subcaudals 53-60. Black ; white rings encircle the body and the tail, and are much wider below than above, where they are reduced to the width of one or two scales ; in immature specimens they are almost as wide as the interspaces of the ground-colour, the first forming a broad collar, partly covering the head ; in adult specimens the whole of the head and neck is black.

It is not scarce in Ceylon, attaining to a length of 2 feet, the tail taking from 4 to 5 inches.

FAMILY OF BLUNT-HEADS—*AMBLYPEPHALIDÆ*.

Body much compressed, slender or of moderate length ; its hinder portion and the tail prehensile ; head short, thick, very distinct from neck ; eye of moderate size, with vertical pupil ; nostril lateral, in a single plate. Shields of the crown of the head sometimes increased in number. Cleft of the mouth much narrower than the external posterior commissure of the lips would indicate ; lower jaw not expansible, covered with large unsymmetrical chin-shields, not separated by a mental groove. Scales smooth or faintly keeled, in from thirteen to fifteen series, those of the vertebral series enlarged. Maxillary bone very short, provided with only a few very small teeth ; palate and lower jaw with strong teeth anteriorly ; no grooved tooth.

These snakes are of small size, and their narrow mouth does not admit of their swallowing large animals; they feed on insects, and live on trees and bushes or under roofs of huts; they are nocturnal animals. Two genera are known in British India,—a third genus, *Dipsadomorus*, being confined to Sumatra:—

Subcaudals entire	<i>Amblycephalus</i> , p. 325.
Subcaudals bifid	<i>Pareas</i> , p. 326.

AMBLYCEPHALUS.

Amblycephalus, sp., *Kuhl*.

Body and tail slender, strongly compressed, prehensile; head thick and large, much elevated, with convex lips, very distinct from neck. Shields of the head irregular: rostral very high; two pairs of frontals of moderate size; an elongate vertical and supraciliaries; a pair of rounded occipitals; smaller shields are sometimes intercalated between those mentioned. Several loreals; a ring of small separate shields round the orbit; anterior labials narrow, high; temporals numerous, scale-like. Scales smooth, thin, elongate, without apical groove, much imbricate, in thirteen series; those of the vertebral series exceedingly large, hexagonal. Ventrals rounded, less than 200 in number; anal and subcaudals simple. Teeth few in number: a long fang anteriorly in the palate and in the lower jaw.

One species.

AMBLYCEPHALUS BOA.

Amblycephalus boa, (*Kuhl*) *Boie, Isis*, 1828, p. 1035.

Dipsas boa, *Schleg. Phys. Serp.* ii. p. 284. pl. 11. figs. 29, 30. *Cantor, Mal. Rept.* p. 78. pl. 40. fig. 3.

Loreals three, one above the other; upper labials nine. Ventrals 152–170; subcaudals 88–112. Purplish, densely marbled and dotted with brown, and with very small rose-coloured spots; cheeks and lips carnation, with a vertical black band below the eye.

The head of this most singular snake resembles much that of a mastiff, the lips being arched and tumid; it climbs with great facility, frequenting the roofs of the huts of the

natives in pursuit of its food, which consists of insects. It belongs properly to the fauna of the archipelago, inhabiting Java, Borneo, and the Philippine Islands; Cantor found it at Pinang; it does not appear to be common anywhere. It readily bites; and attains to a length of 3 feet, the tail being one-third.

PAREAS, *Wagl.*

Body strongly compressed, of moderate length or rather slender; tail of moderate length, prehensile. Cleft of the mouth very short. Shields of the upper side of the head regular. Loreal present, or united with præocular. Scales smooth or faintly keeled, in fifteen series, those of the vertebral series largest. Ventrals rounded, less than 200 in number; anal simple; sub-caudals bifid. Maxillary teeth small, few in number; palatine and mandibular teeth in a continuous series, gradually increasing in length towards the front.

The first of the following species resembles in some respects *Amblycephalus*, whilst the second is intermediate between the first and third:—

- Scales slightly keeled *P. carinata*, p. 326.
 Scales smooth, those of the vertebral series hexagonal; ventrals 194 *P. monticola*, p. 327.
 Scales smooth, those of the vertebral series but little larger than the others;
 ventrals ca. 160 *P. levis*, p. 328.

PAREAS CARINATA.

Dipsas carinata, (Reine.) *Schleg. Phys. Serp.* ii. p. 285, pl. 11. figs. 26-28, and *Abbild.* taf. 45. figs. 10-12.

Pareas carinata, *Wagl. Syst. Amph.* p. 181.

Head of moderate length, thick, elevated, with obtuse snout and tumid upper lips; eye of moderate size, with elliptical pupil; body and tail of moderate length, strongly compressed, prehensile. Rostral shield narrow, high, not reaching to the upper surface of the snout; frontals small, the anterior more than half as large as posterior; vertical six-sided, much longer than broad, with an obtuse angle in front. Supraciliaries long, of moderate width; occipitals not larger than vertical. Nasal simple, pierced by the small nostril; loreal higher than long; a ring of narrow orbitals surrounds the orbit, excluding the labials and the posterior frontal. Eight or seven upper labials, the posterior low. Temporals rather irregularly arranged, scale-like, generally 3+3+3, the three anterior in contact with the oculars; three pairs of broad chin-shields. Teeth slender, of moderate strength; those of the max-

illary are rather small, four in number; those of the palatines and mandibles are longest in front, gradually diminishing in size posteriorly. Scales slightly keeled, thin, in fifteen rows, those of the vertebral series distinctly larger than the others. Ventrals 160-174; anal entire; subcaudals 52-74. Greyish brown, with numerous closely-set, reticulated blackish cross bands; a curved black band on each side of the neck, continued to the eye as a narrow streak. Whitish below, with some irregular brown dots.

This species is not very rare in Java; we have also received a specimen from the Laos Mountains in Cochinchina. It attains to a length of 20 inches, the tail being one-fourth.

PAREAS MONTICOLA*.

Dipsas monticola, Cantor, *Proc. Zool. Soc.* 1839, p. 53.

Head short, flat above, not elevated, distinct from neck, with broad, obtusely rounded snout; eye of moderate size, with vertical pupil; body rather slender, strongly compressed; tail of moderate length, prehensile. Rostral shield subquadrangular, as high as broad, just reaching the upper surface of the snout; anterior frontals twice as broad as long, half the size of posterior, which form a part of the orbital edge. Vertical rather large, six-sided, with an obtuse angle in front and with an acute one behind; supraciliaries of moderate size; occipitals rather narrow, tapering behind. Nasal simple, pierced by the nostril; loreal none, replaced by a large præorbital; another small præorbital is wedged in between the orbit and the third labial; two very narrow postorbitals, the lower of which excludes the fifth labial entirely or partially from the orbit. Seven upper labials, the fourth (or fifth) entering the orbit. Temporals rather irregularly arranged; the two anterior are in contact with the postoculars, the lower being much larger than the upper. Lower labials very narrow; two pairs of very large chin-shields. Teeth slender, feeble: each maxillary is armed with five small teeth; those of the palatines and mandibles are more numerous, and the anterior are a little longer than the following. Scales smooth, thin, in fifteen rows, those of the vertebral series larger than the others, hexagonal. Ventrals 194; anal entire; subcaudals 87. Brown: a black streak commences at each supraciliary, forms a ring behind the occiput, and is continued as a short black band along each side of the neck; along each side of the anterior part of the trunk a series of oblique Y-shaped black cross bands which gradually become indistinct on the middle and hinder parts of the body. Yellowish below, irregularly dotted with brown.

Two specimens, from Assam, have been examined: one is the type, and preserved in the Oxford Museum; the other is 24 inches long, the tail measuring $5\frac{1}{2}$ inches. Mr. Blyth mentions a *Dipsas monticola* from Assam (*Journ. As. Soc. Beng.* 1855, xxii. p. 294); but this must be a very different snake, having 158 ventrals and 106 subcaudals.

* Before I had an opportunity of examining the typical specimen I had named this species *P. nuchalis*, which name has no claim whatever to further notice.

PAREAS LÆVIS.

Amblycephalus levis, (Kuhl) Boie, *Isis*, 1827, p. 519.

Dipsas levis, Schleg. *Phys. Serp.* ii. p. 287, pl. 11. figs. 24 & 25.

Pareas levis, Dunn. & Bibb. vii. p. 442.

Head short, with broad, obtusely rounded snout, not elevated, distinct from neck; eye of moderate size, with elliptical pupil; body of moderate length, compressed; tail short. Rostral shield as high as broad; anterior frontals twice as broad as long, half the size of posterior, which enter the upper part of the orbit. Vertical large, six-sided, as broad as, or broader than, long, with a very obtuse angle in front. Occipitals of moderate size. Nostril rather wide, in the posterior part of a single nasal. Loreal none, replaced by the single præocular. Supraciliary and two postoculars narrow, small, sometimes confluent. Seven or eight upper labials, the third and fourth of which enter the orbit, the two posterior being very low. Temporals rather irregularly arranged, the two anterior being elongate and in contact with the oculars. Maxillary teeth minute, few in number; palatine and mandibular teeth slender, feeble; the latter are closely set, numerous, longest anteriorly, and gradually decreasing in length posteriorly. Specimens from the continent have these teeth rather swollen and more equal in length than specimens from the islands. Scales smooth, thin, without apical groove, in fifteen rows, those of the vertebral series being but little larger than the others. Ventrals 150-164; anal entire; subcaudals 34-46. Brown or blackish ash, marbled with black, the black colour being disposed in irregular cross bands; belly brown (Java), or white with irregular blackish lateral spots (Java, Cochinchina).

This snake is found in Java, Cochinchina (Lao Mountains), and Khasya. Our largest specimen is 16 inches long, the tail measuring 3 inches.

FAMILY OF ROCK SNAKES—*PYTHONIDÆ*.

Body and tail of moderate length or rather slender, rounded; tail prehensile; head with the snout rather long, depressed, truncated or rounded in front. Eye of moderate size, with vertical pupil. Scales smooth, in numerous series; subcaudals two-rowed. Some of the upper and lower labials are pitted. Teeth in the intermaxillary, maxillary, palatine, pterygoid, and mandibular bones, of unequal size; none are grooved. Adult individuals with a spur-like prominence on each side of the vent; it is the extremity of a rudimentary hind limb hidden between the muscles.

The Rock-snakes are found in the hottest parts of Africa, Asia, the East Indian Archi-

pelago, and Australia. They climb as well as they swim; most of them prefer the neighbourhood of water. This family contains the largest snakes.

Only one genus is found in British India.

PYTHON.

Python, sp., *Daud.*

Only the anterior half of the upper side of the head is covered with symmetrical shields, the hinder with scales; rostral shield and a part of the upper and lower labials pitted. Nostrils between two shields unequal in size.

The two species of Indian Rock-snakes are among the largest of living reptiles. Of snakes, only their African congeners and the American *Eunectes murinus* can be placed beside them. Their dimensions and their strength, however, have been much exaggerated: specimens of 18 to 20 feet in length are very rare, although isolated statements of the occurrence of individuals which measured 30 feet are on record and worthy of credit*. Rock-snakes from 15 to 20 feet long have the thickness of a man's thigh, and will easily overpower a small deer, a sheep, or a good-sized dog. But although able to kill these animals, the width of their mouth is not so large that they can swallow one larger than a half-grown sheep. The way in which they seize and kill their prey is the same as that observed in numerous smaller snakes: after having seized the victim, they smother it by throwing several coils of the body over and round it. In swallowing they always commence with the head; and as they live entirely on mammals and birds, the hairs and feathers offer a considerable impediment to the passage down the throat. The process of deglutition is therefore slow, but it would be much slower except for the great quantity of saliva discharged over the body of the victim. During the time of digestion, especially when the prey has been a somewhat large animal, the snake becomes very lazy; it moves but slowly when disturbed, or defends itself with little vigour when attacked. At any other time the Rock-snakes will fiercely defend themselves when they perceive that no retreat is left to them. Although individuals kept in captivity become tamer, the apparent tameness of specimens brought to Europe is much more a state of torpidity caused by the climate than an actual alteration of their naturally fierce temper. The Rock-snakes must attain to a considerable age. A *Python reticulatus* lived in the menagerie of the Zoological Society of London for fifteen years; when brought to England it was about 11 feet long, and in ten years it had attained to a length of 21 feet, after which no further growth could be observed. According to observations made by Bibron on young Rock-snakes born in the Garden of Plants in Paris, this specimen would have been

* We regret to find in the 'Reise der Novara,' ii. p. 247, a passage in which it is stated that the travellers saw in Manilla a living "*Boa constrictor*," 48 feet long and 7 inches thick. Surely none of the naturalists accompanying the expedition can have seen this passage before it was sent to press.

about four years old at the time when it was 11 feet long; so that the growth is much quicker in the first period of life than afterwards. The males remain smaller than the females.

The Rock-snakes will propagate in captivity—the Indian *P. molurus* having bred in Paris, and the African *P. sebae* in London*. In both cases the eggs were incubated by the mother, and in the former successfully hatched. The copulation of the *P. molurus* took place at several times in the months of January and February, and fifteen eggs, of the size of that of a goose, were deposited on the 6th of May. The snake having collected them in a conical heap, coiled herself spirally round and on this heap, entirely covering the eggs, so that her head rested in the centre and at the top of the cone. The snake remained in this position until eight of the eggs were hatched on the 3rd of July.

As almost the same facts have been observed in another species from Africa, we may conclude that all the Pythons in a free state take care of their progeny. An increase of the temperature has been observed between the coils of the snake in both cases, and it is probable that a higher degree of warmth is necessary for the development of the embryonic Pythons than for that of other snakes.

The two species found in British India are:—

- A black line runs from the rostral along the median line of the head and neck . . . *P. reticulatus*.
 A brown spot, shaped like the head of a lance, occupies the crown of the head
 and the nape *P. molurus*.

PYTHON RETICULATUS. *The Ular sawa of the Malays.*

Seba, i. p. 98. tab. 62. fig. 2; ii. p. 83. tab. 79. fig. 1, and p. 85. tab. 80. fig. 1.

Boa reticulata, *Schneid. Hist. Amph.* p. 264.

Python schneiderii, *Merr. Tent.* p. 89. *Schleg. Phys. Serp.* ii. p. 415. pl. 15. figs. 5-7.

— *reticulatus*, *Gray, Zool. Misc.* p. 44. *Dun. & Bibr.* vi. p. 426. *Cantor, Mal. Rept.* p. 55.

A pair of anterior and posterior frontals; one or two other pairs of smaller shields intercalated between the posterior frontals and the vertical. Four upper and about six lower labials are pitted. Scales small, in about seventy-four series round the middle of the trunk. Ventrals 297-330; anal entire; subcaudals 82-102. Ground-colour light yellowish brown, chestnut, or olive: a black line runs from the rostral along the median line of the head and neck; another band from the eye to the angle of the mouth. A series of irregular black rings, these markings being sometimes lozenge-shaped along the back; the scales nearest the black rings are of a light or whitish colour, and, laterally, an irregular ocellated or reticulated, white, black-edged spot is joined to each side of each ring or lozenge. Lower parts yellowish, with irregular small lateral spots; subcaudals marbled with brown.

This is a common species in the Archipelago, inhabiting almost all the islands. The fauna of the Malayan Peninsula bears as much the insular as the continental character, and appears to be the only part of the continent where this Rock-snake is found; according to Cantor it is numerous there and in the neighbouring islands, feeding on quadrupeds and birds. It

* See Selater, in *Proc. Zool. Soc.* 1862, p. 365.

often takes up its abode in outhouses, preying at night, and is thus useful in destroying vermin, although plunder is occasionally committed in poultry-yards. When kept in captivity it is of importance to supply it with a small tank of water, in which it will frequently remain for days. Individuals of 16 feet in length are not of rare occurrence, and some about 30 feet long are on record.

PYTHON MOLURUS. *The Adjiger of the Hindoos.*

Seba, i. p. 59. tab. 37. fig. 1.

Coluber molurus, *L. Syst. Nat.* i. p. 225.

Peddapoda, *Russell, Ind. Serp.* i. pls. 22-24 & 39.

Python tigris, *Daud.* v. p. 241.

— *bivittatus* (part.), *Schleg. Phys. Serp.* ii. p. 403. pl. 15. figs. 1, 3 & 4.

— *molurus*, *Gray, Zool. Misc.* p. 44. *Dum. & Bibr.* vi. p. 417.

A pair of anterior and posterior frontals; several other small shields between the vertical and the posterior frontals. The two anterior upper labials and four of the lower ones are pitted. Supraorbital not divided; the sixth upper labial is below the orbit, entering it. Scales small, in about sixty-five series round the middle of the trunk; those of the outer series large, half the size of the ventrals. Ventrals 242-262; anal entire; subcaudals 60-72. The ground-colour is light greyish brown. A brown spot, shaped like the head of a lance, occupies the crown of the head and the nape; its point rests on the frontals, but frequently it is truncated anteriorly, its extremity being on or behind the vertical; a light median streak divides its triangular portion into two. A dark-brown streak runs from the nostril through the eye to behind the angle of the mouth, gradually becoming broader and confluent with another band running along the lower jaw. A subtriangular brown spot below the eye. Back of the body and tail with a vertebral series of large quadrangular spots, the margins of which are sometimes serrated, sometimes straight; an oblong spot on each side of each of these quadrangular spots. Sides of the body with another series of rather irregular brown spots, which sometimes have a light centre. Lower parts yellowish, brownish or blackish on the sides.

This Python, commonly known under the name of "Rock Snake," and by some misnamed "Boa," is almost peculiar to the continent of India. Common in the Southern Peninsula and in Bengal, it extends northwards into the Saul Forest at the foot of the Himalayas, and probably to Southern China*. Its occurrence in the Malayan Peninsula is problematical, and in Java it is at all events much scarcer than *P. reticulatus*. Ceylon is inhabited by a Python, but it is not known whether it is *molurus* or *reticulatus*—probably the former.

Specimens are known to have been captured which were 20 feet long, and it is probable that it attains to the same size as its congener from the Archipelago. It prefers swampy ground, or at least the neighbourhood of water, where it finds a more regular supply of food in the animals visiting their drinking-places. It feeds on birds, Rodentia, young or small deer, sheep, &c.

* Blyth mentions a specimen from Formosa, sent by Mr. Swinhoe; but, according to a communication from the latter gentleman, it appears that it had been imported into that island from China.

FAMILY OF SAND SNAKES—*ERYCIDÆ*.

Body of moderate length, cylindrical, covered with small, short scales; tail very short, with a single series of subcaudals; head with a broad snout of moderate length, or somewhat elongate. Eye rather small, with vertical pupil. None of the labials are pitted; cleft of the mouth wide; teeth in the maxillary, on the palate, and in the mandible, none in the intermaxillary; the anterior teeth are the longest. Adult individuals with a short conical prominence in a groove on each side of the vent; it is the extremity of a rudimentary hind limb.

The snakes of this family show great similarity to the Pythons and Boas with regard to their internal structure as well as to their external characters. But their tail is very short, not flexible, much less, prehensile; and whilst the snakes of the families mentioned are more or less arboreal, frequenting marshy places with luxuriant vegetation, the Erycides inhabit dry, sandy or stony plains, burrowing with the greatest facility below the surface, and entering crevices and holes in search of their prey, which consists of mice, lizards, and other burrowing snakes. Probably they are seminocturnal, and able to see in dark places as well as in the night. They are found in Northern Africa, in the islands of the Mediterranean, in Asia Minor, in the peninsula of Southern India, and probably in Arabia; two species are known to have been brought from Sikkim.

The following genera occur in British India:—

Mental groove none; scales keeled	<i>Gongylophis</i> , p. 332.
Scales smooth	<i>Cursoria</i> , p. 333.
Mental groove present; scales keeled	<i>Eryx</i> , p. 334.

GONGYLOPHIS, *Wagl.*

Head flat, oblong, scarcely distinct from neck, with the snout rather long and obtusely rounded in front, and without canthus rostralis. Body cylindrical, of moderate length; tail very short, tapering. Nostril lateral, directed upwards; eyes rather small, with vertical pupil. Head covered with scales, only the foremost part of the snout and the lips are shielded; scales small, keeled; ventrals and subcaudals narrow. Clin entirely covered with small scales, without median groove. Anterior teeth in the jaws and on the palate longest.

GONGYLOPHIS CONICUS.

Russell, Ind. Serp. i. p. 5. pl. 4.

Bos conica, Schneid. Hist. Amph. ii. p. 268, and *Denkschr. Münch. Acad.* 1821, vii. p. 119. tab. 6. fig. 2.

Gongylophis conicus, Wagl. Syst. Amph. p. 192. *Günth. Proc. Zool. Soc.* 1860, p. 163.

Eryx conicus, Dum. & Bibr. vi. p. 470.

Rostral shield nearly twice as broad as high, with two pairs of small shields behind, the outer of which are the anterior nasals. The labials are low, subequal in size, twelve in number. The remainder of the snout and the crown of the head are equally covered with small keeled scales; none of the shields enter the orbit, which is entirely surrounded by scales. The margin of the lower jaw is surrounded by a narrow belt of numerous labials, the entire chin and throat being covered with small smooth scales. The middle of the body is surrounded by from forty-one to forty-seven series of short keeled scales, the keels becoming much stronger posteriorly. Ventrals 168-176; subcaudals 17-23. Brownish grey, with a dorsal series of large quadrangular brown blotches edged with dark brown and whitish; the spots are frequently confluent and form a broad zigzag band; irregular smaller brown spots along the side; the lower parts white; an oblique brown streak on the temple proceeding from behind the eye.

This snake is common in many parts of the peninsula of Southern India. Messrs. von Schlagintweit brought a specimen from Sikkim, which, according to their notes, was captured at an elevation of 4900 feet. Nothing positive is known of its habits, which probably, however, are similar to those of *Eryx*. It attains to a length of more than two feet.

CURSORIA.

Cusoria, Gray.

This genus is distinguished from *Gongylophis* by having smooth scales; moreover it appears to have a mental groove, but this is not quite certain, as the head of the single specimen known is very much shrunk.

CURSORIA ELEGANS.

Cusoria elegans, Gray, Viper. Snakes, p. 107.

Head oblong, of moderate width and length, with the snout truncated in front, not distinct from neck; trunk cylindrical, of moderate length; tail short, tapering. The eye is very small, with vertical pupil; nostril lateral, very narrow. The whole head, above, below, and on the sides, is covered with small scales, those on the snout being somewhat larger. Rostral shield large, broad, wedge-shaped, with an anterior and lower surface. A pair of small frontal

shields behind the rostral. Eleven small upper labials, the sixth of which is the highest, situated below the orbit, which is entirely surrounded by small scales; one series of scales between the orbit and the labials. A mental groove is present (!). The scales are small, rounded, smooth, in thirty-six series round the middle of the body. Ventrals 184; subcaudals perhaps 30 (the tip of the tail is broken off). Light brownish olive, with a dorsal series of irregular rounded chestnut-brown, black-edged spots; numerous small brown spots along the side and the belly.

The single specimen known is considerably shrunk and not in a good state of preservation; it is 16 inches long, and said to be from Afghanistan.

ERYX.

Eryx, sp., *Daudin*.

Head not distinct from neck, with the snout obtusely conical, and with a sharp transverse anterior edge. Body cylindrical, of moderate length; tail very short. Nostril very narrow, lateral; eyes small, with vertical pupil. Head covered with scales; snout shielded; scales small, slightly keeled. Chin with some small shields along the middle separated by a median groove.

One species extends from the south of Europe to Persia; the other is Indian.

ERYX JOHNNI.

Boa johnii, *Russell, Ind. Serp.* ii. p. 18. pl. 16, and p. 20. pl. 17. fig. 1.

Clathronia johnii, *Gray, Zool. Misc.* p. 45. *Günth. Proc. Zool. Soc.* 1860, p. 164.

Eryx johnii, *Dum. & Bibr.* vi. p. 458.

— *maculatus*, *Hallowell, Proc. Acad. Nat. Sc. Philad.* 1849, p. 184 c. fig.

Rostral shield very large, wedge-shaped, subtriangular; two pairs of small shields (frontals), one behind the other, on the upper surface of the snout; from ten to thirteen upper labials, none of which enter the orbit, which is entirely surrounded by scales. The remainder of the head is covered with small smooth scales. The body is surrounded by from fifty-four to sixty-five longitudinal series of slightly keeled scales. Ventrals 194-209; subcaudals 26-36. Upper parts reddish olive, uniform or with irregular small black spots and dots; lower parts generally marbled with blackish. Young specimens with three or four broad brownish rings round the hinder part of the body.

This is a common species in the plains of the peninsula of Southern India; a large specimen, spotted all over with black, was brought from Sikkim by Messrs. von Schlagintweit, who fix the elevation at which it was captured at 9800 feet above the level of the sea. No other instance of the occurrence of this snake at any considerable elevation is known. It is also found in the Punjab. It is perfectly harmless, and never attempts to bite. It is frequently found in the possession of serpent-charmers, who mutilate the end of the short, thick tail in such a manner that the scarred extremity somewhat resembles the form of the head. Such specimens are shown as "deadly two-headed snakes," and frequently brought to Europe. A specimen in the menagerie of the Zoological Society of London lived there for about eight years, and fed regularly on young mice. The keeper assured me that it frequently covered its prey with saliva, which I have never seen. It always kept itself hidden below the gravel at the bottom of its cage. The species attains to a length of nearly 4 feet, the tail measuring 4 inches.

FAMILY OF WART SNAKES—*ACROCHORDIDÆ*.

Body of moderate length, rounded or slightly compressed, covered with small, wart-like, not imbricate, tubercular or spiny scales; tail rather short, prehensile. Head rather small, not distinct from neck, covered with scales like the body. Eye small. Nostrils close together, at the top of the snout. Teeth short, but strong, subequal in size, in the jaws and on the palate. Viviparous.

Only three species of this family are known, forming as many genera, if, indeed, the Javan *Xenodermus*, with broad ventral and subcaudal shields, belongs to it. The two others are found in British India:—

- Tail without broad fold below: terrestrial *Acrochordus*, p. 335.
 Tail with a broad fold below: aquatic *Chersydrus*, p. 336.

ACROCHORDUS, *Hornstedt*.

The hind part of the body and tail are slightly compressed; tail not expanded by a fold of the skin. No ventral or subcaudal shields whatever; each scale with a strong triangular keel, terminating in a spine; many scales with another pair of smaller spines.

Only one species is known.

ACROCHORDUS JAVANICUS.

Acrochordus javanicus, *Hornst. Abhandl. Acad. Stockh.* 1797, vii. p. 306. *Schleg. Phys. Serp.* ii. p. 424, and *Abbild.* p. 55. taf. 17. figs. 12-14. *Cantor, Mal. Rept.* p. 58.

Head rather short and broad, with the snout much broader than long, and with the eyes directed forward. The nostrils are minute, in the centre of a small circular nasal shield, the nasals being close together, in front of the snout. The cleft of the mouth is of moderate width, not bent upwards posteriorly; it is closed anteriorly by a central notch of the upper jaw and by two lateral ones of the lower, receiving corresponding protuberances of the opposite jaw. Brown above, more yellowish on the sides; the young with large irregular dark-brown spots, confluent into undulating and interrupted bands on the back; these spots become very indistinct with age.

This snake is very rare, and has been found only in Java, at Pinang, and Singapore. It grows to a length of 8 feet, and it has been ascertained by actual observation that its habits are terrestrial. Cantor justly compares its physiognomy with that of a thorough-bred bulldog: a female in his possession brought forth not less than twenty-seven young ones in the course of about twenty-five minutes; they were very active, and bit fiercely. Hornstedt found a quantity of undigested fruits in the stomach. No opportunity of making further observations on the habits of this remarkable snake should be lost.

CHERSYDRUS, Cuv.

The hind part of the body and the tail are slightly compressed; the surface of the latter is vertically expanded by a fold of the skin running along its lower side. No ventral or subcaudal shields whatever; a low fold of the skin runs along the median line of the abdomen. Scales with a short tubercle-like keel, not spiny.

Only one species is known.

CHERSYDRUS GRANULATUS.

Hydrus granulatus, *Schneid. Amph.* p. 243.
Acrochordus fasciatus, *Shaw, Zool.* iii. pp. 11, 576. pl. 130.
Chersydrus fasciatus, *Cuv. Règne Anim.*
Acrochordus granulatus, *Cantor, Mal. Rept.* p. 59.
Chersydrus granulatus et annulatus, *Gray, Viper. Snakes*, p. 61.

The cleft of the mouth is of moderate width, not bent upwards posteriorly; it is closed

anteriorly by a central notch of the upper jaw and by two lateral ones of the lower, receiving corresponding protuberances of the opposite jaw. The nostrils are round, and can be hermetically closed by a valve in their interior. Only the scales occupying the medial abdominal fold are spinous, their keels terminating in a minute point. Brownish black, with whitish cross bands on the sides and abdomen; head with some small yellowish spots. In the young the bands are more clearly defined, and extend on to the back, where they are generally interrupted.

This is a thoroughly aquatic species, as is indicated by its broad, compressed tail, which, however, differs greatly from that of the Hydrophides in not having the processes of the caudal vertebrae prolonged. It is more or less scarce, but found in the rivers and on the sea-coasts of numerous islands of the Archipelago, extending to New Guinea and the Philippines. It inhabits also the eastern coasts of Southern India and the Malayan Peninsula, and sometimes it may be seen three or four miles distant from the shore. Cantor found six eggs with developed embryos in a female which he dissected, the mother being nearly 3 feet long, the embryos 10½ inches. In food and general habits this snake resembles the Hydrophides; but it is not venomous, as has been stated by previous writers.

Second Suborder.

OPHIDII COLUBRIFORMES VENENOSI—VENOMOUS COLUBRINE SNAKES.

Snakes with an erect, immoveable, grooved or perforated tooth in front of the maxillary.

Two families of this Suborder are represented in the East Indies:—

- | | |
|---|---------------------|
| Tail conical, tapering | ELAPIDÆ, p. 337. |
| Tail strongly compressed, paddle-shaped | HYDROPHIDÆ, p. 352. |

FAMILY OF ELAPIDES—*ELAPIDÆ*.

Body cylindrical or subcylindrical; tail rather short, tapering. Head with the normal number of shields above; loreal constantly absent. Nostril lateral. Eye rather small, with round pupil. The venom-fang shows a distinct groove along its front, and the canal in its interior terminates in a slit at its extremity.

The snakes of this family inhabit all the tropical regions and Australia; those of British India belong to the following genera:—

A. *Neck dilatable*: NAJIDÆ.

All the subcaudals are bifid *Naja*, p. 338.

Three pairs of very large shields round the occipitals *Ophiophagus*, p. 340.

B. *Neck not distensible*: ELAPIDÆ.

Scales in fifteen series, those of the vertebral series hexagonal; subcaudals simple. *Bungarus*, p. 342.

Scales in fifteen series, those of the vertebral series hexagonal; subcaudals bifid. *Xenurelaps*, p. 345.

Scales in thirteen series, those of the vertebral series hexagonal *Megarophis*, p. 346.

Scales in thirteen series, those on the back of equal size *Callophis*, p. 346.

NAJA, *Laur.*

Body and tail of moderate length; belly flat; head rather high and short, not very distinct from neck, which is very dilatable, the anterior ribs being elongate. The shields of the head normal, but the loreal is absent. Nostril wide, lateral, between two shields; eye of moderate size, with round pupil. One præ-, three, sometimes two or four post-oculars. Six upper labials, the third and fourth entering the orbit; the third forms the lower half of the anterior margin of the orbit. Scales smooth, much imbricate, in numerous series round the hood. Anal entire; subcaudals two-rowed. The fang is grooved, with a foramen at its extremity; one or two small ordinary teeth at a short distance behind it.

NAJA TRIPUDIANS. *The Cobra or Naga.*

Coluber naja, *L. Syst. Nat.* i. p. 382.

Naja lutescens, *Laur. Syn.* p. 91. *Cantor, Mal. Rept.* p. 117.

Russell, Ind. Serp. i. tab. 5 & 6; ii. tab. 1.

Naja tripudians, *Merr. Tent.* p. 147. *Gray, Ind. Zool. Schleg. Phys. Serp.* ii. p. 406. pl. 17. figs. 1-3. *Günth. Colubr. Snakes*, p. 223.

— *larvata*, *Cantor, Proc. Zool. Soc.* 1839, p. 32.

— *atra*, *Cantor, Ann. & Mag. Nat. Hist.* 1842, ix. p. 482.

— *kaouthia*, *Less. in Bélanger. Voy. Ind. Orient. Zool.* p. 312, *Rept.* pl. 2 (very bad).

The sixth upper labial is small, and forms a suture with a large temporal shield; two temporals in contact with the postoculars. Scales on the foremost part of the neck in twenty-five or twenty-three series.

Var. a. Uniform brownish olive above, with a pair of very conspicuous white, black-edged spectacles on the neck; belly yellowish, uniform or slightly marbled with brown, and with a broad blackish cross band, corresponding to the spectacle-like mark.

- The lower anterior temporal shield is in contact with three or four other temporals; ventrals 193: Madras, Anamallay Mountains, Dukhun, Bengal, Pinang.
- The lower anterior temporal shield is in contact with two other temporals: Sikkim.

Var. β. Dark brown above, many scales with whitish edges; a pair of spectacles on the neck, white, black-edged, and more conspicuous in young individuals than in old ones, in which the spectacles are uniform black; a large ovate black blotch on each side of the belly, corresponding to the spectacles; anterior part of the belly with three or four black cross bands, posterior part marbled with blackish or entirely black. The lower anterior temporal shield is in contact with three temporals; ventrals 195; subcaudals 62: Ceylon.

Var. γ. Olive-brown above, with a pair of very conspicuous white, black-edged spectacles; posterior third of the trunk with distant narrow white cross bands. Belly yellowish, punctulated with brown, and with a broad black cross band behind the spectacles. The lower anterior temporal shield is in contact with two other temporals; ventrals 174: China.

Var. δ. Uniform blackish brown above and below; head of a lighter colour; a pair of elongate-ovate white spots on the neck. The lower anterior temporal shield is in contact with two other temporals; ventrals 180: China.

Var. ε. Uniform brownish black above and below, without spectacles, sometimes with an indistinct black cross band on the front part of the belly.

- The lower anterior temporal is in contact with two other temporals; ventrals 184-187: Dekkan, Pinang.
- The lower anterior temporal is in contact with three other temporals: Sikkim.

Var. ζ. Uniform black; a large white ocellus on the neck with black centre and black margin; anterior part of the belly whitish, with a broad black cross band; the lower temporal is in contact with two other temporals; ventrals 174: Siam.

Var. η. Black above and below; a large white ocellus on the neck with black centre; about fifteen narrow, equidistant, well-defined white bands across the trunk; the lower temporal is in contact with three other temporals; ventrals 170: Siam.

Var. θ. Black above and below; a large white ocellus on the neck with black centre and black edge. Body with rather irregular whitish cross bands; the two anterior are broad, the following are divided into a pair of narrower bands; and in the middle of the body the bands become indistinct and are dissolved into small spots. The lower anterior temporal is generally in contact with two, sometimes with three other temporals; ventrals 193; subcaudals 53: *Naja larvata*, Cantor, from Bombay, Calcutta, Assam, and Sikkim.

All the varieties mentioned form but one species, which is widely spread, and only too common all over the continent of the Indian region. A black form, without spectacles, and with fewer series of scales on the neck, the *Naja sputatrix* of Reinwardt, is limited to the East Indian Archipelago, and appears to be a distinct species. The true *Naja tripudians*,

however, is by no means confined to the continent and Ceylon, being found in a number of the larger islands of the Archipelago. It extends eastwards to the Sutch, and westwards to the Chinese island of Chusan. Singularly, it has never been observed by Mr. Hodgson in the valley of Nepal, but occurs in different parts of the Himalayas, reaching an altitude of 8000 feet in Sikkim. It attains to a length of 5 feet, feeding on small mammals and birds, on lizards, frogs, toads, and fishes; in order to obtain its prey it occasionally climbs trees or the roofs of huts; it is an expert swimmer, and is sometimes found at a considerable distance out at sea. It is more a nocturnal animal than a diurnal one, and ovoviviparous. Its chief enemies are the jungle fowl, which destroy the young brood, and the *Herpestes* or ichneumons, which will attack and master the largest Cobra: in districts where the Cobras or other venomous snakes have too much increased in number, the most efficient way of destroying them is to protect their natural enemies.

The Cobra, the most common venomous snake of India, is so much an object of dread to the natives, of wonder to the Europeans, and of profit to the numerous itinerant snake-charmers, that it has become as celebrated an animal as its cousin, the *Naja haje*, which was a symbol of female divinities among the ancient Egyptians. Almost every writer on the natural productions of the East Indies has contributed to the natural history of this snake, which has been surrounded by such a number of evidently fabulous stories that their repetition and contradiction would fill a volume.

This snake is frequently brought to Europe, and will live in captivity for years. Two may be well kept together; and it appears as if they felt some attachment for each other, for when they are excited by having food brought into their cage, or by some other incident, they will frequently fight each other, raising the anterior part of the body, spreading the hood, and darting as if to bite, but always carefully avoiding to wound. When, however, a third individual or any other snake is brought into the same cage, they attack and kill it. They feed more frequently at dusk and during the night than in the daytime; they drink often and much.

The Cobra is one of the most deadly snakes, the poison of which affects the whole system in a very short time; comparatively few are the cases where the person bitten escaped death without the timely application of remedies, and only too frequently the psychical and physical health of the unfortunate individual remains for a long time affected, suffering periodical returns of most painful symptoms. We refer to our general remarks on the poison of snakes and on its antidotes, pp. 167 & 168.

OPHIOPHAGUS, *Gthr.*

Body rather elongate; tail of proportionate length; head rather short, depressed, scarcely distinct from neck, which is dilatable. Occipitals surrounded by three pairs of large shields, the two anterior of which are temporals. Nostril between two nasals. Loreal none; one or two præ-

three post-oculars. Scales smooth, much imbricate, in transverse rows, in fifteen series round the body, but in many more round the neck; those of the vertebral series are rather larger than the others. Ventrals more than 200; anal entire; anterior subcaudals simple, posterior two-rowed, sometimes all bifid. Maxillary with a large fang in front, which is perforated at the end, showing a longitudinal groove in front; a second, small, simple tooth at some distance behind the fang.

Only one species is known.

OPHIOPHAGUS ELAPS.

Naja bungarus, *Schleg. Phys. Serp.* ii. p. 476, and in *Verhand. Overz. Bezitt. Nederl. Ind. Zool.* p. 71. pl. 10 (young).

— *elaps*, *Schleg. Phys. Serp.* ii. p. 485.

— *vittata*, *Elliott, Madr. Journ. Lit. & Sci.* xi. pl. 1.

Hamadryas (hannah) *ophiophagus*, *Cantor, As. Res.* xx. p. 87. pl. 10-12, and *Mal. Rept.* p. 116.

Trimeresurus ophiophagus, *Dunn. & Bibr.* vii. p. 1245.

Hamadryas elaps, *Günth. Colubr. Snakes*, p. 219.

This snake is easily recognized by the large shields surrounding the occipitals. There is generally one preorbital; only once have I found it divided into two, viz. in a specimen from the Philippine Islands. Seven upper labials, the third and fourth entering the orbit, the third the largest, the sixth and seventh very low; temporals large, 2+2. Ventrals 215-262; subcaudals 80-100; the number of entire anterior subcaudals varies much. The colours of the adult are subject to great variation:—

a. Olive-green above; the shields of the head, the scales of the neck, hinder part of the body and of the tail edged with black; trunk with numerous oblique, alternate black and white bands converging towards the head; lower parts marbled with blackish, or uniform pale greenish: Malayan Peninsula, Bengal, Peninsula of Southern India.

β. Brownish olive, uniform anteriorly, with the scales black-edged posteriorly; each scale of the tail with a very distinct white, black-edged ocellus (as in *Ptyas mucosus*): Philippine Islands.

γ. Uniform brownish black, scales of the hinder part of the body and of the tail somewhat lighter in the centre; all the lower parts black, except the chin and throat, which are yellow: Borneo.

Young specimens have a much more varied coloration: they are black, with numerous white, equidistant, narrow cross bands descending obliquely backwards; head with four white cross bands: one occupies the extremity of the snout, the second across the posterior frontals, the third across the crown of the head, behind the orbit; the fourth across the occiput to the angle of the mouth; the two latter bands are composed of oval spots. In a specimen from the Anamallay Mountains the belly is black, and the white bands extend

across, being wider than on the back; in a second specimen, of which the locality is unknown, the belly is white, each ventral having a blackish margin.

This remarkable snake, although rather rare, has a very wide geographical range: it has been found in almost every part of the Indian continent, in the Andaman Islands, in Java, Sumatra, Borneo, in the Philippine Islands, and, according to Duméril, also in New Guinea. It is one of the largest and most deadly venomous snakes, attaining to a length of more than 12 feet, of which the tail is about one-fifth. It inhabits hollow trees, and is sometimes found resting between the branches; it feeds on other snakes.

BUNGARUS, *Daud.*

Body rather elongate; tail comparatively short; head more or less dilated, depressed, with broad, rounded muzzle, scarcely distinct from neck, which is not dilatable. Nostril between two nasals. Loreal none; one præ-, two post-oculars. Scales smooth, moderately imbricate, disposed in oblique rows, forming fifteen longitudinal series round the body; those of the vertebral series are very broad, hexagonal. Ventrals between 200 and 250; anal and subcaudals entire. Maxillary with a fang in front, which is perforated at the end, showing a longitudinal groove in front; a second, small, simple tooth at some distance behind the fang.

All the species occur on the continent of India; they are extremely closely allied to one another, so that it is sometimes difficult to distinguish species from varieties. We first give a general description.

The body is subcylindrical and rather slender, the head depressed, scarcely distinct from neck, the tail short. Eye small, with round pupil. Rostral shield broader than high, reaching to the upper surface of the snout; anterior frontals half the size of posterior; vertical five-sided; occipitals tapering behind. Nostril rather wide, between two nasals; one præocular, not extending on to the upper surface of the snout; two postoculars. Seven upper labials, the third and fourth entering the orbit, the fifth and sixth the largest. Temporals rather small, $1 + 2 + 3$. Scales without apical groove.

The name of the genus has been derived from a vernacular name, Bungarum, used on some parts of the coast of Coromandel. The Bungarums are terrestrial snakes, feeding on small mammals, lizards, small snakes, and toads. Although diurnal, yet, like all Indian serpents, they prefer the shade to the sun. They are shy and attempt to escape, but when attacked they defend themselves fiercely: Cantor says that they are capable of darting nearly the anterior half of the body. Their bite is always very dangerous; but the magnitude of

the danger depends, as in other venomous snakes, on many circumstances—chiefly on the size and energy of the individual snake, and on the place of the wound. As the fangs of the Bungarums are comparatively short, the wound is always superficial, and can be easily excised and cauterized; also, experiments made on animals show that the general effect on the whole system becomes visible only after a lapse of time.

All the species known belong to the continental fauna, two of them extending to some of the islands of the Archipelago; the diagnoses given, although short, will be found fully sufficient to recognize and distinguish these closely allied species.

BUNGARUS CÆRULEUS.

- ?? Coluber candidus, *L. Mus. Ad. Fried.* tab. 7. fig. 1.
Pseudoboa carulea, *Schneid. Hist. Amph.* p. 284.
Boa Krait, *Williams, As. Res.* ii. p. 328.
Russell, Ind. Serp. i. tab. 1.
Boa lineata, *Shaw, Zool.* iii. p. 356.
Bungarus cœruleus, *Daud. Hist. Rept.* v. p. 270. *Dum. & Bibr.* vii. p. 1273.
 — *lividus*, *Cantor, Proc. Zool. Soc.* 1839, p. 32.
 — *candidus*, *Cantor, Mal. Rept.* p. 113 (not synon.).
 — *arcuatus*, *Dum. & Bibr.* vii. p. 1272.
 — *lineatus*, *Günth. Colubr. Snakes*, p. 219.

The first temporal shield is considerably longer than high. Ventrals 201–221; subcaudals 38–56. Lower parts uniform white; upper parts bluish or brownish black, uniform, or with more or less numerous, very narrow white cross streaks, not quite as broad as a scale, and generally radiating from a white vertebral spot. No collar.

Var. *α*. Upper parts uniform blackish brown: *B. lividus*, *Cantor*, from Assam. In young specimens the head is white, with a black line between the occipitals.

Var. *β*. A vertebral series of equidistant small white spots, from which narrow transverse streaks proceed.

Var. *γ*. Upper parts with narrow white streaks arranged in pairs: *B. arcuatus*, *D. & B.*

This species is rather common throughout the peninsula of Southern India, in Bengal, and in Assam, but not in Ceylon. It attains to a length of 54 inches, of which the tail takes about one-seventh.

BUNGARUS FASCIATUS.

- Seba*, ii. pl. 58. fig. 2. *Russell, Ind. Serp.* i. pl. 3.
Pseudoboa fasciata, *Schneid. Hist. Amph.* p. 283.
Bungarus annularis, *Daud. Rept.* v. p. 263. *Schleg. Phys. Serp.* ii. p. 457. pl. 16. fig. 21, and *Abbild.* taf. 48. figs. 1–5.
 — *fasciatus*, *Cantor, Mal. Rept.* p. 113.

The first temporal shield is scarcely longer than high. Ventrals 200–233; subcaudals

32-36. Body with alternate broad black and yellowish rings, extending across the belly; there are from twenty-five to thirty-three of these black rings round the trunk; the first is the broadest, and produced into a triangular process, the point of which rests on the vertical shield. Head black anteriorly and on the sides, separated from the triangular process by a yellow V-like mark. Lower parts and throat uniform yellow.

This is the largest species of *Bungarus*, attaining to a length of 4 feet, the tail taking one-tenth of it. It has a wide range, but appears to be rather locally distributed; it has been brought from Java, from the Malayan Peninsula and Pinang, from the Tenasserim coast, from Bengal and China, and from the coast of Coromandel. Jerdon says that he has seen specimens only in the Northern Circars at Ganjam, where it is not very common. In Ceylon it is represented by a distinct species.

BUNGARUS CEYLONICUS.

Bungarus fasciatus, var. B, Günth. *Colubr. Snakes*, p. 221.

The first temporal shield is considerably longer than high. Ventrals 229; subcaudals 36-40. Broad black rings encircle the whole body, eighteen to twenty round the trunk, the white intervals being very narrow and spotted with black; no collar. The young has a broad white collar, interrupted by a black occipital streak, and extending over the sides of the head; the black bands do not extend across the belly as in mature age.

This species or variety is peculiar to Ceylon, and not uncommon; our largest specimen is 40 inches long, the tail measuring $3\frac{1}{2}$ inches. I have found *Uropeltides* in its stomach.

BUNGARUS SEMIFASCIATUS.

Bungarus semifasciatus, Kuhl, *Iris*, 1827, p. 552. *Schleg. Phys. Serp.* ii. p. 459. pl. 16. figs. 18-20, and *Abbild.* taf. 18. figs. 6-10 (synon. part.). *Dum. & Bibr.* vii. p. 1271.

Aspidoclonion semifasciatum, Wagl. *Icon.* tab. 2.

Bungarus multicinctus, Blyth, *Journ. As. Soc. Beng.* 1861, xxix. p. 98.

The first temporal shield is considerably longer than high. Ventrals 210-221; subcaudals 44-52. Black bands across the back, but not extending across the belly, from thirty-five to fifty in number; the anterior are broader than the posterior; they are separated by white cross bands, each of which is as broad as one or two scales; the black bands extend entirely round the tail. Collar none.

We have received this species only from China and from the island of Formosa: as *B. caruleus* has been confounded with it by Schlegel, it is very doubtful whether it occurs in the localities mentioned by this herpetologist. It attains to a length of 4 feet, the tail being one-ninth of the total length. It feeds on lizards when young, and afterwards probably on small mammals.

XENURELAPS.

Body subcylindrical, long and slender; belly rounded; head short, subtriangular, with rounded snout, not distinct from neck, which is not dilatable; tail short. The shields of the head normal, but the loreal is absent. Nostril lateral, between two shields; eye small, with round pupil; one præ-, two post-oculars. Scales smooth, not much imbricate, in fifteen rows; those of the vertebral series enlarged, hexagonal. Anal entire; subcaudals bifid. Maxillary with a grooved fang in front, and with a small smooth tooth behind.

Only one species is known.

XENURELAPS BUNGAROIDES.

Elaps bungaroides, Cantor, *Proc. Zool. Soc.* 1839, p. 33.

Very similar in general habit to a *Bungarus*. Shields of the upper surface of the head normal, the occipitals somewhat tapering behind. Rostral as broad as high. Nostril open, round. Loreal none, the præorbital being in immediate contact with the postnasal. Two postoculars; seven upper labials, the third and fourth entering the orbit. Temporals 1+2+3, the anterior in contact with both postoculars. Six lower labials; two pairs of short chin-shields, the anterior in contact with three lower labials. Scales in fifteen series, those of the vertebral series enlarged, hexagonal. Ventrals 237; anal entire; subcaudals 46. Upper parts black, with narrow white, angular, transverse lines, the angle of which is pointed forwards; these lines are more distinct in front than behind; there are about forty-eight on the trunk. The lower part of the rostral shield white; a white line across the snout, before the eyes; two interrupted, divergent white lines commence on the vertical shield, each descending to the side of the neck; another band descends from behind the eye to the fifth and sixth labial. Lower parts whitish, with irregular blackish cross bands.

From Chirra Punji. The single specimen known is fortunately still preserved in the Museum of the University of Oxford; it is 15½ inches long, the tail measuring 1½ inch.

MEGÆROPHIS, *Gray*.

Body elongate, tail of moderate length; head flat, depressed, with broad, rounded snout, scarcely distinct from neck, which is not dilatable. Nostril between two nasals. Loreal none; one præ-, two post-oculars. Scales smooth, moderately imbricate, in thirteen series, those of the vertebral series being very broad, hexagonal. Ventral shields about 225; anal and anterior subcaudals entire, the others bifid. Maxillary with a fang in front, which is perforated at the end, showing a longitudinal groove in front; a second small, simple tooth at some distance behind the fang.

Only one species is known.

MEGÆROPHIS FLAVICEPS.

Bungarus flaviceps, *Reinh. Dansk. Vidensk. Afhandl.* x. p. 253. tab. 3. fig. 5. *Cantor, Catal.* p. 112. *Günth. Catulr. Snakes*, p. 221.

Megærophis formosus, *Gray, Ann. & Mag. Nat. Hist.* 1849, iv. p. 247.

Black, with a white vertebral line which becomes red posteriorly; head and neck blood-red, in young specimens with a black median band. A white zigzag band along the two outer series of scales, which becomes red and broader posteriorly, occupying nearly the entire hinder part of the tail. Belly red in specimens from Borneo, black anteriorly and red posteriorly in specimens from Pinang. Ventrals 209-226; subcaudals 38-52, the ten or sixteen anterior of which are entire.

This snake has the structure of the head-shields and of the vertebral scales of a *Bungarus*, whilst the resemblance of its coloration to that of *Callophis bivirgatus* is very striking; it is rare, and found in Borneo, Java, Sumatra, and at Pinang. It attains to a great length, our largest specimen measuring 6 feet and 1 inch, the tail being 9 inches long.

CALLOPHIS, *Gray*.

Body subcylindrical, very long and slender; belly rounded; head short, obtuse, with broad snout, not distinct from neck, which is not dilatable; tail short. The shields of the head normal, but the loreal is absent. Nostril wide, lateral, between two shields; eye small, with round pupil; one præ-,

two-postoculars; temporals in a single longitudinal series. Six, seven, or eight upper labials, the third and fourth entering the orbit. Scales smooth, not much imbricate, in thirteen rows, those of the vertebral series not enlarged. Subcaudals bifid. Maxillary with a grooved fang in front, without other teeth behind.

The Callophides are very similar to one another: their body is cylindrical, of nearly the same width throughout, and much elongate, the number of ventral shields almost always exceeding 200. The head is of moderate length, slightly depressed, not distinct from neck, with broad rounded snout. The nostril is lateral, rather narrow, situated between two shields; eye small, with round pupil. Cleft of the mouth of moderate width, not much extensible. The shields on the upper side of the head normal, the occipitals generally somewhat elongate. Loreal absent; the single præocular forms a short suture with the hinder nasal; it extends on to the upper surface of the head, but does not reach the vertical, which is comparatively narrow. Two postoculars, in contact with the single anterior temporal. The number of upper labials does not exceed eight, generally there are less than eight, the third and fourth entering the orbit. Scales invariably in thirteen rows, smooth, polished, not much imbricate. Tail short, tapering, with bifid subcaudals.

The Callophides are more numerous on the East Indian continent than in the Archipelago; they are the representatives of the American *Elaps*, of the Australian *Vermicella*, and of the African *Homorelaps*; they appear to prefer hilly countries to the plains, live constantly on the ground, and are slow in their movements. In their habits, in their form, and in their powerless muscular organization they show the greatest similarity to the *Calamaria*; and this is why the Callophides almost entirely feed on the latter—the venomous snake being able to overpower the non-venomous. Both these genera have also the same geographical distribution; and Ceylon, where we do not find the *Calamaria*, is not inhabited by a single *Callophis*. If we are allowed to judge from the number of individuals of both genera brought to Europe in collections, the *Calamaria* are about twice as numerous as the *Callophides*. Cantor has had the opportunity of observing them in a living state; he says that they are generally seen lying motionless, with the body thrown into many irregular folds, but not coiled. Although they are diurnal, their sight, from the minuteness of the pupil, appears to be as defective as their sense of hearing, and they may be closely approached without apparently their being aware of danger. He never observed them to bite voluntarily, even when provoked, and he had difficulty in making an adult *C. gracilis* bite a fowl,—although, of course, the venom of these snakes is as virulent as that of a viper, the animals used for the experiments having died in the course of from one to three hours after they had been bitten. Therefore the greatest caution should be observed in catching or handling these snakes. The shortness of their fangs and the small quantity of their poisonous fluid, however, will always give a very fair chance of recovery if an accident should occur and the proper remedies be applied.

All the species known occur in British India:—

- Head vermilion, immaculate *C. bivirgatus*, p. 348.
 A vermilion, black-edged band runs along the vertebral line from the occiput to the tip of the tail *C. intestinalis*, p. 348.
 A black vertebral line with small, equidistant, button-like swellings, accompanied by a series of round black spots on each side *C. gracilis*, p. 349.
 Upper labials seven; a yellow band across the head, behind the eyes . . . *C. maclellandii*, p. 349.
 Upper labials six; a yellow band across the head, behind the eyes *C. annularis*, p. 350.
 Upper labials six; ventrals 258-274. Head and neck black, spotted with yellow *C. trimaculatus*, p. 350.
 Upper labials seven; ventrals 205-247. Upper part of the snout black, emitting three black longitudinal streaks, which join a broad black collar . . *C. maculiceps*, p. 351.
 Upper parts blackish or black, uniform, or with indistinct ornamental markings; lower parts red; head with symmetrical black markings *C. nigrescens*, p. 351.

CALLOPHIS BIVIRGATUS.

- Elaps bivirgatus*, (Boie) *Schleg. Phys. Serp.* p. 451. pl. 16. figs. 10 & 11; and *Abbild.* taf. 47. *Günth. Colubr. Snakes*, p. 230.
 — *flaviceps*, *Cantor, Mal. Rept.* p. 109.
Doliophis flaviceps, *Girard, in U. S. Explor. Exped. Herpetol.* pl. 10. figs. 1-5 (coloured from a specimen in spirits).
Callophis bivirgatus, *Günth. Proc. Zool. Soc.* 1859, p. 81.

Head, belly, and tail vermilion (yellowish in spirits); body, a dorsal band on the tail, and the outer portion of the ventral shields black; an azure band, longitudinally divided by a white zigzag line, along the two outer series of scales. Upper labials six. Ventrals 248-284; subcaudals 38-50. Temporal shields two, one behind the other, subequal in size.

Found in Borneo, Java, Sumatra, the Malayan Peninsula, and at Pinang. We have a specimen which is 54 inches long, the tail measuring 5 inches.

Two narrow white lines run along the back sometimes; this variety has been named *Elaps tetratania* by Dr. van Bleeker.

CALLOPHIS INTESTINALIS.

- Seba*, ii. tab. 77. fig. 6 (var. javan.).
Aspis intestinalis, *Laur. Syn. Amph.* p. 106.
Elaps furcatus, *Schneid. Hist. Amph.* p. 303. *Schleg. Phys. Serp.* ii. p. 450. pl. 16. figs. 12 & 13; *Abbild.* taf. 46. figs. 1-8 (var. javan.); and *Verhand. Nederl. Overz. Bezitt. Zool.* p. 64. *Mollet & Dillw. Labuan*, p. 45.
Russell, Ind. Serp. ii. pl. 19 (var. javan.).
Maticora lineata, *Gray, Illustr. Ind. Zool.* c. fig. (var. malay.).
Elaps intestinalis, *Cantor, Mal. Rept.* p. 107. *Günth. Colubr. Snakes*, p. 230.
Callophis intestinalis, *Günth. Proc. Zool. Soc.* 1859, p. 82. pl. 16. fig. A. (var. philipp.), B. (var. javan.), C. (var. malay.).

Head light brown above, yellowish below, spotted with black on the sides; a vermilion,

black-edged band runs from the occiput to the tip of the tail; a buff-coloured band, with an upper and lower black border, runs along the joining edges of the two outer series of scales; the upper black border is as broad as the stripe of reddish-grey ground-colour on the side of the back. Belly with alternate pale citrine and black cross bands, the latter colour occupying three or four ventral shields together, whilst the former rarely occupies more than two; tail with three black rings, which, however, are sometimes absent.

Upper labials six; ventral shields 223-271; subcaudals 24-26.

The coloration described above is that which is found in the variety from the Malayan Peninsula, Pinang, Singapore, and Central India (Malwah) (var. *malayana*)*. Specimens from Java have the vertebral line continued on the head, where it is forked; it has no black edges; and the ground-colour is brown.

This species occurs also in Sumatra, Borneo, and in the Philippine Islands (var. *philippina*); it attains to a length of 2 feet, the tail measuring $1\frac{1}{2}$ inch.

CALLOPHIS GRACILIS.

Calliophis gracilis, Gray, *Ind. Zool. c. fig.* (dentition incorrect).

Elaps nigromaculatus, Cantor, *Mal. Rept.* p. 108. pl. 40. fig. 7.

Head yellowish brown above, paler below, each shield with a blackish spot. Ground-colour of the trunk and tail reddish light-grey; a black vertebral line runs from the occiput to the tip of the tail, showing small button-like swellings in regular interspaces; along the lower part of the side a white band, edged with black above and below, and longitudinally divided into two by a black median line. A series of large, round, black, white-edged spots along each side of the back, the spots being disposed in quincunx order with the small swellings of the vertebral line. Belly pale yellow with black cross bands, both colours being nearly equally divided. Tail at the root and near the apex with a broad black, white-edged ring; its lower surface is vermilion, with a black cross band in the middle between the rings.

Six upper labials; ventrals 238-311; subcaudals 21-28; anterior temporal very large, posterior small.

This fine species has been found only at Pinang and Singapore; it attains to a length of 28 inches, the tail measuring $1\frac{1}{2}$ inch.

CALLOPHIS MACCLELLANDII.

Elaps maclellandii, Reinh. *Calc. Journ. Nat. Hist.* 1844, iv. p. 532; and *Vidensk. Medd. Naturh. Forén. Kjöbenhavn.* 1860, p. 247.

— *personatus*, Blyth, *Journ. As. Soc. Beng.* 1855, xxiii. p. 298.

— *univirgatus*, Günth. *Colubr. Snakes*, p. 231.

Calliophis univirgata, Günth. *Proc. Zool. Soc.* 1859, p. 83. pl. 17.

— *maclellandii*, Günth. *Proc. Zool. Soc.* 1861, May 28.

Upper labials seven; temporals small, 1+1+1; anal bifid.

* A specimen of this variety has been received by Dr. van Bleeker as "*Elaps thersites*."

Head and neck black above, with a yellow cross band behind the eyes. Body and tail reddish brown, generally with a black vertebral line from the nape to the tip of the tail. Belly yellowish, with black cross bands or quadrangular black spots.

Var. *a.* Belly with uninterrupted black cross bands, alternately limited to the belly, or extending up the sides of the body, so as to cover scales of the four outer rows and give the appearance of a lateral series of large black spots. The three last cross bands of the trunk form complete rings crossing the vertebral line; tail with three other black rings. This specimen is $26\frac{1}{2}$ inches long, tail $2\frac{1}{2}$ inches. Ventrals 218; subcaudals 28.

Var. *β.* Belly with quadrangular black spots rather irregularly disposed, and not extending up the sides. Tail without black rings. This specimen is 18 inches long, tail $1\frac{1}{2}$ inch. Ventrals 224; subcaudals 25.

Var. *γ.* The cross bands reach entirely across the back, forming rings, from twenty-two to twenty-eight in number; no black vertebral line, which, however, is indicated by isolated small spots. Ventrals 196–218; subcaudals 27–34.

Varieties *a.* and *β.* are from Nepal and Darjeeling, *γ.* from Assam.

CALLOPHIS ANNULARIS. (Plate XXIV. fig. I.)

Head and neck black above, with a broad yellow cross band behind the eyes. Body and tail reddish brown, without longitudinal band, but with forty narrow, equidistant, black, white-edged rings; each of them is about as broad as a scale on the back (those round the tail being broader), and occupies one ventral shield on the belly. Belly yellowish, with a black cross band in the middle between the rings; each of these cross bands occupies a ventral shield, so that about every third ventral is black.

Upper labials six; temporals small, 1+1+1: the first very narrow, the third the largest. Ventrals 208; anal bifid; subcaudals 33.

I have examined only one specimen of this species, remarkable on account of its singular coloration. It is marked "India"; and 19 inches long, the tail measuring 2 inches.

CALLOPHIS TRIMACULATUS.

Russell, Ind. Serp. i. pl. 8.

Vipera trimaculata, Daud. Rept. vi. p. 25.

Elaps trimaculatus, Merr. Tent. p. 143.

Coluber melanurus, Shaw, Zool. iii. p. 552.

Callophis trimaculatus, Günth. Proc. Zool. Soc. 1859, p. 83. pl. 16. fig. E.

Light bay above: an indistinct line formed by minute brown dots, along each series of scales. The upper side of the head, the neck, and a spot below the eye black; snout with some irregular small yellow spots; a yellow spot on each temporal shield; a subtriangular yellow spot on the middle of the neck; the black of the neck edged with yellow behind.

Tail marbled with black below, and with two black rings, each of which is variegated with yellow. Belly uniform white (red during life).

Upper labials six; temporals elongate, 1 + 1, equal in size. Ventrals 258-274; anal bifid; subcaudals 35.

Besides the typical specimen from Russell's collection and from the coast of Tenasserim, I have now received a second, which is probably from Bengal. Both agree in every point, only the colours are better preserved in the latter. They are very small, 12 inches long, the tail measuring $\frac{7}{8}$ inch.

Jerdon in his "Catalogue of Reptiles inhabiting the Peninsula of India," Journ. As. Soc. Beng. xxii. p. 522, enumerates an *Elaps malabaricus*, Jerdon, besides an *Elaps melanurus*, Shaw, both being so insufficiently characterized that it is impossible to determine what species had been observed by the author; the "*E. malabaricus*" appears to be the true *E. melanurus*, Shaw.

CALLOPHIS MACULICEPS.

Elaps melanurus, Cantor, *Mal. Rept.* p. 106. pl. 40. fig. 6 (not Shaw).

Elaps maculiceps, Günth. *Cobubr. Snakes*, p. 232.

Callophis maculiceps, Günth. *Proc. Zool. Soc.* 1859, p. 84. pl. 16. fig. D.

Light bay above, with a series of distant black dots along each side of the back; belly uniform whitish (red during life). Upper and lateral parts of the snout black, with a white line along the canthus rostralis; three black streaks proceed from the snout and join a broad black collar—one running along the occipital suture, the others from the eye along the temple. Tail marbled with black below, with two black rings.

Vertical shield six-sided, elongate, much longer than broad; seven upper labials; temporals 1 + 1, the anterior much larger than the posterior. Ventrals 205-247; anal bifid; subcaudals 24-32.

We have seen only one specimen of this species, which is found in the Malayan Peninsula; according to Cantor it exceeds a length of 2 feet.

CALLOPHIS NIGRESCENS. (Plate XXIV. figs. F, F'.)

Callophis nigrescens, Günth. *Ann. & Mag. Nat. Hist.* 1862, ix. p. 131.

— *concinus*, Beddome, *Madr. Quart. Journ. Med. Sc.* vi.

Upper parts dark blackish ash, or black, the lower uniform red. Upper part of the head symmetrically marbled with black; a black spot below the eye; another descends from the occipital to the angle of the mouth; a black horseshoe-like collar, with the convexity directed forwards; a narrow black vertebral line slightly edged with yellowish runs from the collar

to the tip of the tail; a series of small ovate black spots, indistinctly edged with whitish, along each side of the trunk, disappearing posteriorly; tail coloured like body, without black rings. In old examples the black dorsal stripe and the black lateral spots disappear, and only the whitish edges of the latter remain, forming indistinct longitudinal lines.

Vertical shield elongate. Upper labials seven; temporals 1 + 1, the anterior twice the size of the posterior. Ventrals 232-247; anal entire, in one specimen bifid; subcaudals 33-42.

I have examined three specimens of this species, one of which was sent by Captain R. H. Beddome from the Nilgherries; the largest is 4 feet long, the tail measuring 5 inches. We have given (F) two views of its head, and one of a portion of the body, to show its coloration: for comparison we have added (F') a figure of a portion of the body of a younger example.

FAMILY OF SEA SNAKES—*HYDROPHIDÆ*.

Body subcylindrical anteriorly, more or less compressed posteriorly; tail strongly compressed, elevated, paddle-shaped. Head-shields generally abnormal; loreal none. Nostrils situated on the upper side of the head, except in *Platurus*. Eye small, with round pupil. The venom-fang small, grooved in front, and with a canal in its interior terminating in a short slit.

The Sea-snakes are inhabitants of the tropical parts of the Indian and Pacific Oceans, extending from the coast of Madagascar to the Isthmus of Panama; they are most numerous in the East Indian Archipelago and in the seas between Southern China and North Australia, being represented on the outskirts of the geographical range we have mentioned by only one species, and that the most common, viz. *Pelamis bicolor*. They pass their whole life in the water (with the exception perhaps of *Platurus*), and soon die when brought on shore.

The most striking feature in the organization of the Sea-snakes is their elevated and compressed tail, the processes of the caudal vertebrae being much prolonged and styliform. The hind part of the body, and sometimes forwards to beyond the middle of its length, is also compressed, and the belly forms a more or less sharp ridge. The ventral shields would be of no use to snakes moving through a fluid, and not over a rough hard surface, and therefore they are either only rudimentary or entirely absent. The genus *Platurus*, however, is a most remarkable exception in having ordinary ventral shields; and this circumstance, together with the lateral position of its nostrils, induce me to believe that these serpents frequently go on shore, sporting or hunting over marshy ground. In many Sea-snakes the hind part of the body is curved and prehensile, so that they are enabled to secure a hold by twisting this part of the body round corals, seaweeds, or any other projecting object. Their tail answers all the purposes of the same organ in a fish, and their motions in the water are almost as rapid as they are uncertain and awkward when removed out of their proper element. Their nostrils

are placed quite at the top of the snout, as in crocodiles and in freshwater snakes, so that they are enabled to breathe whilst the entire body and the greater part of the head are immersed in the water. These openings are small and subrescent, and provided with a valve interiorly, which is opened during respiration, and closed when the animal dives. They have very capacious lungs, extending backwards to the anus, and consequently all their ribs are employed in performing the respiratory function; by retaining a portion of the air in these extensive lungs, they are enabled to float on the surface of the water without the slightest effort.

The "scales" of the Sea-snakes are frequently very different from those of other snakes: they overlap one another in only a few species (*Platurus*, *Hydrophis stokesii* and *belcheri*), in others they are but little imbricate and rounded behind, and, again, in others they are of a subquadrangular or hexagonal form, placed side by side, like little shields; the less imbricate they are, the more they have lost the polished surface which we find in other snakes, and are soft, tubercular, sometimes porous. The form and the arrangement of the scales afford good specific characters, but it is necessary to observe that they generally differ in size, arrangement, and form in the different parts of the body. In my descriptions I have always counted the series of scales on the neck—that is, at a distance from the head about equal to its length, having found that the numbers at that place are least subject to variation in different individuals; whilst I have taken the characters of the form or arrangement of the scales from those in or behind the middle of the body, the scales on the neck being narrow and more or less imbricate in almost all the species.

The shields of the head differ so much in their arrangement from those of other snakes, that a snake may be recognized as a marine species by an inspection of the head only. The large nasal shields occupy the upper anterior part of the snout and are generally contiguous, replacing the anterior frontals which are absent; the single pair of small frontals are homologous with the posterior frontals of other snakes. There is a vertical, a pair of supraciliaries and another of occipitals, one ocular, and one or two postoculars; the number of the latter is rather constant in the same species. Loreal none. The labials are somewhat irregularly arranged, frequently subdivided, especially the posterior; in most of the species, small pieces, nearest to the labial margin, are detached from the lower labials. There is a triangular mental shield in front of the lower jaw, behind which the first pair of lower labials form a suture together; one or two pairs of chin-shields follow. Several Sea-snakes are distinguished by having some or all of the head-shields broken up into smaller irregular pieces, whilst *Platurus* differs from all others in an arrangement of the shields which is extremely similar to that in the *Elapidae*. The Sea-snakes shed their skin very frequently, and the skin peels off in pieces as in the lizards, and not as in the freshwater serpents, in which the integuments come off entire.

Several species are remarkable for the extremely slender and prolonged anterior part of the body, for which we use the term "neck," and which terminates in a very small head. These snakes can hardly form a separate genus, as we find a most complete transition from them to the forms with thick and short body. The extreme forms must differ considerably in their habits, but no observations on this point are on record.

The eye is small, with round pupil, which is so much contracted by the light when the snake is taken out of the water, that the animal becomes blinded and is unable to hit any

object it wants to strike. The *tongue* is short, and the sheath in which it lies concealed opens near to the front margin of the lower jaw; scarcely more than the two terminating points are exerted from the mouth when the animal is in the water. The mouth shuts in a somewhat different way from that in other snakes, the middle of the rostral shield being produced downwards into a small lobule which prevents the water from entering the mouth; this lobule is most developed in *Enhydrina*. There is generally a small notch on each side of the lobule for the passage of the two points of the tongue. Cantor says that when the snake is out of the water and blinded by the light, it freely makes use of its tongue as a feeler.

The food of the Sea-snakes consists entirely of small fish; I have found all kinds of fish in their stomach—among them species with very strong spines (*Apogon*, Siluroids); as all these animals are killed by the poison of the snake before they are swallowed, and as their muscles are perfectly relaxed, their armature is harmless to the snake, which commences to swallow its prey from the head, and depresses the spines as deglutition proceeds. There cannot be the slightest doubt that the Sea-snakes belong to the most poisonous species of the whole order. Russell and Cantor* have ascertained it by direct observation: tortoises, other snakes, and fish died from their bite in less than an hour, and a man succumbed after four hours. Accidents are rarely caused by them, because they are extremely shy and swim away on the least alarm; but when surprised in the submarine cavities forming their natural retreats, they will, like any other poisonous terrestrial snake, dart at a pole; or, when out of the water, they attempt to bite every object near them, even turning round to wound their own bodies (Cantor). They cannot endure captivity, dying in the course of two or three days even when kept in capacious tanks.

The males may be easily distinguished from the females by a distinct swelling on each side of the tail, extending from the root to, or beyond, the middle of its length; sometimes the whole tail is thickened, and such specimens may be taken for distinct species. All the species are viviparous, bringing forth, without leaving the sea, from four to nine young ones. The young are more brightly coloured than the adult, the faint cross bands of the latter being complete black rings in the former; the tail also of the young is comparatively thicker and less compressed than in the adult. That they live to a great age I infer from the circumstance that we find relatively very large examples of almost every species, but that such examples are very scarce. Now, as they have very formidable and very numerous enemies in the sea-eagles (*Haliaetus*), in the sharks, and other large raptatorial fishes, it appears to me to be a just conclusion, that, if Sea-snakes of large dimensions were more numerous than they are, they would, in spite of those enemies, arrive at that size in a shorter period than that which we assume as necessary for their growth. The greatest size, however, to which some species attain, according to positive observation, is about 12 feet, and, therefore, far short of the statements as to the length of the so-called "Sea-serpents." The largest example I have seen measured only 8 feet.

There is no other group of reptiles the species of which are so little known, and the synonymy of which is so confused, as that of the Sea-serpents. All the preceding authors, with the exception of Gray, have worked at them with the idea that the species were less numerous than they in reality are; thus confounding forms which had been previously distinguished, though imperfectly characterized. Having had the great advantage of examining

* Trans. Zool. Soc. ii. p. 303.

and comparing, first, a portion of Russell's typical specimens, or specimens captured in the same seas as those from which Russell received his examples, and, secondly, the types of Shaw and Gray, I find the results of my examinations so much at variance with those of others, that it is necessary to treat on all the species of this family, and not to confine myself to those alone which are known or supposed to be found in the Indian seas. Moreover, our present knowledge of the geographical distribution of most of the species is extremely vague, and I have reason to believe that, as in other families of snakes, so in the Sea-snakes, numerous species are very local, whilst others extend over an enormous area.

Synopsis of the Genera.

- A. *Ventral shields well developed, flat.*
 Two pairs of frontal shields *Platurus*, p. 355.
- B. *Ventral shields well developed, with a median ridge.*
 Scales imbricate *Aipysurus*, p. 357.
- C. *Ventral shields narrow, or rudimentary or absent.*
 * *Nasals separated by frontal shields.*
 Ventral shields distinct to the vent *Disteira*, p. 358.
- ** *Nasals contiguous.*
 Head covered with scales behind *Acalyptus*, p. 359.
 Head short or of moderate length, entirely shielded; lower jaw without notch in front *Hydrophis*, p. 360.
 Head of moderate length, entirely shielded; lower jaw deeply notched in front *Enhydrina*, p. 381.
 Snout very long, spatulate *Pelamis*, p. 382.

PLATURUS, Latr.

Body subcylindrical, of moderate length. Shields of the head subnormal in number and arrangement; nostrils lateral, in a single nasal shield, both nasals being separated from each other by a pair of anterior frontals. Scales imbricate, smooth; ventral shields well developed; tail with two series of subcaudals.

This genus approaches the Land-snakes in several characters. The shields of the head are very regularly disposed: there are two pairs of frontals, frequently with an azygos shield between the hind pair. The nostril is lateral, piercing a single narrow nasal shield; loreal absent; one pre- and two post-oculars. Seven upper labials, the third and fourth of which enter the orbit; temporals scale-like, 1+2+3. The throat is covered by two pairs of chin-shields anteriorly and by scales posteriorly, the ventrals commencing at some distance behind the head. The scales are regularly imbricate, smooth, short, slightly rounded behind; the

number of longitudinal series on the body varies much, from nineteen to twenty-five, in different individuals, without affording a character for specific distinction; it is more constant on the front part of the trunk. The ventral shields are broad, and sometimes show a lateral keel. Anal bifid. The tail is longer and thicker in males than in females, and covered with high, short, shield-like scales, the two lower series of which may be considered as subcaudals.

The poison-fang is short, and not followed by a series of other simple teeth as in *Hydrophis*. A very small single tooth is implanted at some distance behind the poison-fang, and is frequently lost.

These snakes have quite the physiognomy of an *Elaps*, and the cleft of the mouth is not turned upwards behind as in other sea-snakes; the eye is rather small. Neither the tail nor the hind part of the body is prehensile; and although we have not received positive information concerning their habits, it becomes evident from their whole organization that they must differ considerably from the other types of the family in this respect.

PLATURUS SCUTATUS.

Coluber laticaudatus, L. Mus. Ad. Fried. 1754, tab. 16. fig. 1.

Laticauda scutata, Laur. Syn. Rept. p. 109. Cantor, Mal. Rept. p. 125.

Hydurus colubrinus, Schneid. Hist. Amph. p. 238.

Platurus fasciatus, Latr. Rept. iv. p. 185.

Hydrophis colubrinus, Schleg. Phys. Serp. ii. p. 514. taf. 18. figs. 18-22; Faun. Japon. Rept. p. 92. tab. 10.

Generally an azygos shield between the posterior frontals; scales of the front part of the trunk in twenty-one or twenty-three longitudinal series; ventral shields from 213 to 241. Body surrounded by from twenty-five to fifty black rings. Crown of the head black; the first and second black mark of the head and neck are joined below by a black longitudinal band, commencing from the chin; snout and side of the head yellow, with a black band running through the eye.

After having examined nearly fifty examples of this species, I have come to the conclusion that the number and width of the black cross bands do not constitute specific characters in these snakes. The length of the tail also varies with the sex. It is a common species, extending from the Bay of Bengal to the Chinese seas and to the coasts of New Zealand. The largest example I have seen is exactly 5 feet long.

PLATURUS FISCHER. (Plate XXV. fig. A.)

Platurus fischeri, Jan, Iconogr. descript. in Rev. et Mag. Zool. 1859.

No azygos shield between the posterior frontals; scales of the front part of the trunk in nineteen longitudinal series; ventral shields 232-241. Trunk surrounded by from thirty-three to thirty-six black rings, which are broader than the interspaces. A black band crosses the occiput and extends forward over the vertical plate and over the lower jaw, but, gene-

rally, it is not confluent with the next following ring. Upper part of the snout yellow, upper labials black.

I have no doubt that this is a distinct species, as eight specimens examined by myself show the same assemblage of characters; they are from the Bay of Bengal, from Chartaboum on the coast of Siam, from New Guinea, and from Aneiteum (New Hebrides). The largest specimen is only 30 inches long.

AIPYSURUS, *Lacép.*

Body not much compressed, with trenchant belly, of moderate length. Shields of the head generally divided into more or less numerous smaller pieces; normally only one pair of frontals; nostrils superior, each in a single nasal, the nasals being contiguous to each other. Scales of moderate size, imbricate, smooth or slightly tubercular; ventral shields well developed, with a longitudinal median ridge. Subcaudals broad, entire.

The species of this genus appear to belong rather to the fauna of Polynesia and Australia than to that of British India, no instance of a specimen captured in the seas of the latter countries being on record.

AIPYSURUS ANGUILLÆFORMIS.

Thalassophis anguillæformis, Schmidt, *Abhandl. Naturw. Hamb.* ii. p. 76. taf. 1.

— *muræformis*, Schmidt, *l. c.* p. 77.

? *Tomogaster eydouxii*, Bibr. in *Voy. Pôle Sud, Rept.* pl. 6. (This figure distinctly shows twenty-one series of scales on the highest part of the body.)

Tomogaster eydouxii, Gray, *Viper. Snakes*, p. 59.

? *Aipysurus levis*, Guichen. *Voy. Pôle Sud, Rept.* p. 21.

Aipysurus levis, Dum. & Bibr. vii. p. 1326. pl. 77 bis. fig. 4. Fischer, *Abhandl. Naturw. Hamb.* iii. p. 32 (not *Lacépède*; *Lacépède*'s typical specimen has 151 ventral shields).

— *margaritophorus*, Bleek. *Natuurk. Tydschr. Nederl. Ind.* xvi. p. 49.

Scales on the highest part of the body in seventeen series, perfectly smooth. Ventral shields 142*. Tail covered laterally with scales similar to those of the trunk, and terminating in a large shield-like scale. Shields of the head not, or but little, subdivided. Upper parts brownish, with cross bands of yellow, black-edged scales; head uniform blackish. An older example (described by Schmidt) is yellowish, with numerous rhombic, rather irregular, confluent brown spots on the back.

* This number has been found not only by Schmidt, but also by myself in two examples.

Specimens have been captured on the coast of Java; the largest is more than 2 feet long. A female, 20 inches long, with the yellow cross bands mentioned, had two half-developed embryos in her oviduct.

AIPYSURUS LEVIS.

Aipysurus laevis, *Lacép. Ann. Mus.* iv. pp. 197, 210. pl. 56. fig. 3.

Hypotrophis jukesii, *Gray, in Jukes, Voy. Fly.* p. 333. pl. 1.

Stephanohydra fusca, *Gray, Viper. Snakes*, p. 60 (not *Tschudi*).

Aipysurus fuliginosus, *Dum. & Bibr.* vii. p. 1327. pl. 77 bis. figs. 1 & 2. *Fischer, Abhandl. Naturw. Hamb.* iii. p. 33.

Scales on the highest part of the body in twenty-one rows, perfectly smooth. Ventral shields 151(-152)-154; scales on the side of the tail elevated, band-like; terminal scale of the tail very large. Shields of the head much subdivided in old examples, which are uniform brown.

I have examined four adult specimens from Darnley Islands, New Caledonia, and New Guinea. The largest example I have seen measures more than 5 feet.

AIPYSURUS FUSCUS.

Stephanohydra fusca, *Tschudi, in Wieg. Arch.* 1837, p. 331. tab. 8.

Aipysurus fuscus, *Fischer, Abhandl. Naturw. Hamb.* iii. p. 33.

Scales on the highest part of the body in nineteen rows; those of the outer series and the ventral shields with small tubercles, which are more distinct in old individuals than in young ones. Ventral shields 157-165-166. Scales on the side of the tail larger than those on the body. Shields of the head much subdivided in old examples. Either uniform brown, or each scale and ventral shield with a large brownish-black spot near the hind margin.

This species belongs to the fauna of the Australian seas; the larger of our specimens is 39 inches long.

DISTEIRA, *Lacép.*

Body compressed, of moderate length; head shielded above: a pair of anterior frontals between the nasals, which are small. Scales imbricate; ventral shields distinct, but small.

DISTEIRA DOLIATA.

Disteira doliata, Lacép. *Ann. Mus.* iv. p. 199. pl. 57. fig. 2. *Dum. & Bibr. Erpétol. gén.* vii. p. 1831 (not synon.).

— dumerilii, *Jan, Iconogr. descript. in Rev. et Mag. Zool.* 1859.

One postocular. Scales in thirty-nine or forty-one series round the highest part of the body, and having a short central keel; ventrals 234, bicarinate. Back with broad brownish cross bands, the interspaces of the light ground-colour being again divided by narrow brownish transverse streaks, at least on the anterior part of the trunk.

Only the typical specimen of this species is known; it is 33 inches long; no record of the locality where it was obtained has been preserved.

ACALYPTUS, *Dum. & Bibr.*

Posterior half of the trunk compressed, of moderate length. Head covered with scales above, the snout and superciliary region only being shielded. Scales imbricate; ventral shields none.

ACALYPTUS SUPERCILIOSUS.

Acalyptus superciliosus (vel *peronii*!), *Dum. & Bibr.* vii. p. 1340.

Head small, scarcely longer than broad; body of moderate length, with the anterior portion rather slender. Two labials below the orbit; two postoculars. Nasals forming a suture together; a pair of frontals, as large as the nasals; the nostrils are between the nasals and frontals; twenty-three series of scales round the neck; scales slightly imbricate, each with a more or less prominent short keel. Trunk with twenty-two black cross bands, tapering on the belly, and about half as broad as the interspaces; each interspace with a very faint greyish cross band. Belly with narrow blackish transverse bands alternating with those descending from the back.

This is one of the scarcest Ophidians, only two specimens being known to exist in collections; the larger, 26 inches long, is in the British Museum. It is believed to inhabit some part of the south-western Pacific.

HYDROPHIS.

Hydrophis, sp., *Daud.*

Posterior part of the body strongly compressed. Head short or of moderate length, shielded above; only one pair of frontals; nostrils superior, in a single nasal shield, both nasals being contiguous to each other. Scales imbricate or not imbricate, not polished, generally with a tubercle or with a keel. Ventral shields very narrow, or quite rudimentary, or entirely absent. Lower jaw without notch in front.

Synopsis of the Species.

I. *Scales more or less distinctly imbricate.*

A. *Scales large, in not more than seventeen longitudinal series round the neck*: *Kerilia*, *Gray*.

Head short *H. jerdonii*, p. 362.

B. *Scales much imbricate, rather small, in forty-three to forty-seven series round the neck; ventral shields split into two*: *Hydrus*, (*Shaw*) *Gray*.

Body stout *H. stokesii*, p. 363.

C. *Scales in twenty-three to thirty-eight series round the neck; head not very small; anterior part of the body (neck) not, or moderately slender*: *Hydrophis*, (*Daud.*) *Gthr.*

Head rather short and broad; neck and body of moderate length. One postocular. Belly with only a few ventral shields *H. major*, p. 363.

Head of moderate size and width; neck and body not elongate. One postocular. Ventrals broad, 310 *H. robusta*, p. 364.

Head of moderate size and width; neck and body of moderate length. Two postoculars. Ventrals broad, 317; scales with a short keel; terminal scale of the tail very large *H. belcheri*, p. 364.

Head rather small; neck and body somewhat elongate. One postocular; scales strongly keeled. Ventrals not much larger than the adjoining scales *H. caerulea*, p. 365.

Head of moderate size and width; neck and body somewhat elongate. Two postoculars; scales strongly keeled, the keel of each scale with two tubercular prominences *H. aspera*, p. 365.

Head of moderate size and width; neck and body somewhat elongate. One postocular. Back with a series of round black spots, alternating with black cross bands *H. spiralis*, p. 366.

Head of moderate size and width; neck and body rather elongate. Two postoculars; scales faintly keeled. Ventrals broad, 320-426; terminal scale of the tail small or of moderate size *H. cyanocincta*, p. 367.

Head rather small and short; neck and body elongate. One postocular; twenty-seven series of scales round the neck. Ventrals twice as large as the adjoining scales. Trunk with sixty broad black rings, nearly suppressing the ground-colour *H. melanosoma*, p. 367.

- Head rather small and narrow; neck slender. Two postoculars; twenty-three series of scales round the neck. Ventrals not twice as large as the adjoining scales. Trunk with forty-one cross bands *H. subcineta*, p. 368.
- Head small; neck slender. Two postoculars; twenty-seven to twenty-nine series of scales round the neck. Ventrals not twice as broad as the adjoining scales. Trunk with from forty-three to sixty-one black rings, not tapering on the sides *H. nigrocincta*, p. 368.
- Head rather small; neck slender. Two postoculars; twenty-eight series of scales round the neck. Ventrals more than twice as broad as the adjoining series. Trunk with from forty-two to forty-eight cross bands *H. elegans*, p. 369.
- Head rather small; neck slender. One postocular; thirty-three to thirty-five series of scales round the neck; vertical short *H. torquata*, p. 369.
- D. *Head very small; neck exceedingly slender: Liopala, (Gray) Gthr.*
The length of the thin part of the body is more than one-third of the total.
One postocular; thirty-one to thirty-three series of scales round the neck. Trunk encircled by from fifty-nine to sixty-seven blackish rings. *H. chloris*, p. 370.
The length of the thin part of the body is one-third of the total. One postocular; thirty-one to thirty-three series of scales round the neck. Trunk with from forty-eight to fifty-eight blackish cross bands extending to the middle of the side *H. lindsayi*, p. 371.
Two postoculars; twenty-six to twenty-eight series of scales round the neck. Ventrals 376. Trunk with from sixty to sixty-four rhombic blackish cross bars; sides and belly not banded *H. atriceps*, p. 371.
One postocular; twenty-three series of scales round the neck. Trunk with thirty-eight broad black cross bands, confluent on the back and belly *H. latifasciata*, p. 372.
One postocular; nineteen to twenty-three series of scales round the neck. Trunk with from fifty-three to fifty-nine complete blackish rings *H. coronata*, p. 372.
Two postoculars; thirty-three series of scales round the neck. Trunk with sixty-two blackish rings *H. diadema*, p. 373.

11. *Scales not imbricate, placed side by side.*

- A. *Head very small; neck exceedingly slender: Microcephalophis, (Less.) Gray.*
One postocular. Ventral shields 228-294, those on the hinder half of the body split into two *H. gracilis*, p. 373.
Two postoculars. Ventral shields 316, all undivided *H. fasciata*, p. 374.
One postocular. Ventral shields 412-440, those on the hinder half of the body split into two *H. cantoris*, p. 374.
- B. *Head of moderate size; anterior part of the body not, or moderately elongate: Thalassophis, (Schmidt) Gthr.*
Head narrow, elongate; body rather slender. Two postoculars. Ventral shields twice as broad as the adjoining scales, 350 in number *H. lapemoides*, p. 375.
Head narrow, elongate; body rather slender. Two postoculars. Ventral shields twice as broad as the adjoining scales, 271 in number. Scales keeled *H. longiceps*, p. 375.
Head narrow, elongate; body rather slender. One postocular. Ventral shields distinct, only the anterior being twice as broad as the adjoining series, 398 in number *H. stricticollis*, p. 376.
Head rather narrow and produced; body somewhat elongate. Two postoculars. Ventral shields twice as broad as the adjoining scales, 252-260

- in number. Scales with a central tubercle. The first upper temporal shield much longer than high *H. ornata*, p. 376.
- Head rather thick and short; body of moderate length. Two postoculars. Ventral shields nearly twice as broad as the adjoining scales, 253-258 in number. The first upper temporal shield is not much longer than high; thirty-five or thirty-seven series of scales round the neck *H. ellioti*, p. 377.
- Head and body of moderate width and length. Two postoculars; nasal shields longer than broad. Ventrals more than twice as broad as the scales, 258 in number. The first upper temporal shield longer than high; twenty-eight series of scales round the neck *H. pachycercus*, p. 378.
- Head of moderate size and width; body of moderate length. Two postoculars; nasal shields as broad posteriorly as they are long; anterior ventral shields broad *H. viperina*, p. 378.
- Head rather short; body moderately stout. Two postoculars. Ventrals distinct, but not twice as broad as the adjoining series. Back and sides with large rounded spots, each with a lighter centre *H. ocellata*, p. 378.
- Head short and thick; body rather stout; shields of the snout irregular. Two postoculars; scales with a strong white keel. Ventrals bicarinate, not larger than the adjoining scales *H. anomala*, p. 379.
- Head short and thick; body stout. One postocular. Ventral shields nearly twice as broad as the scales of the adjoining series *H. curta*, p. 379.
- Head short and thick; body stout. One postocular. No distinct ventral shields. Trunk with from forty-one to forty-three blackish cross bands, not extending downwards to the belly *H. hardwickii*, p. 380.
- Head short and thick; body stout. One postocular. No distinct ventral shields. Trunk encircled by from twenty-nine to thirty-four (thirty-seven) black rings *H. loreata*, p. 380.

HYDROPHIS JERDONII. (Plate XXV. fig. B.)

Hydrus nigrocinctus, var., *Cantor, Mal. Rept.* p. 129. pl. 40. fig. 8.

Kerilia jerdonii, *Gray, Viper. Snakes*, p. 57.

Head short, with the snout declivous and rather pointed; body of moderate length. Frontal shields small, not much larger than præocular; one postocular; five upper labial shields, the third and fourth of which enter the orbit, the last below the postocular; two or three large temporals on the side of each occipital, the anterior of which enters the labial margin behind the fifth labial shield. Two pairs of chin-shields, in contact with one another. Scales imbricate, large, higher than long, with the apex slightly truncated; each scale with a strong keel; they are disposed in fifteen or seventeen series round the neck, and in nineteen or twenty-one in the middle of the body. Ventral shields distinct, but not twice as large as the scales of the adjoining series, bituberculate, 235-238 in number. Anal shields small; terminal scale of the tail large. A series of seven simple teeth behind the grooved fang in front. Trunk with from thirty-four to thirty-eight black cross bands, broadest on the back and extending to the belly in young and half-grown specimens.

I have examined four examples, among which are the types of the descriptions of Gray and

Cantor; they were captured on the coasts of Madras and Pinang. The largest is 35 inches long, the tail measuring 4 inches. We have given three views of its head, of the natural size.

HYDROPHIS STOKESII.

Hydrus major, *Shaw*, *Zool.* iii. p. 558, descript. part: "and in one specimen, &c.," third line from bottom; not figure.

— *stokesii*, *Gray*, in *Stokes, Australia*, i. p. 502. tab. 3 (very good).

Hydrophis schizopholis, *Schmidt*, *Abhandl. Naturw. Hamb.* 1846, i. p. 166. taf. 15. *Dum. & Bibr. Erpét. gén.* vii. p. 1357.

Hydrus major, *Gray*, *Viper. Snakes*, p. 58.

— *annulatus*, *Gray*, *Viper. Snakes*, p. 59.

Astrotia schizopholis, *Fischer*, *Abhandl. Naturw. Hamb.* iii. p. 38.

Head rather short and broad; body stout. Two or three labial shields below the eye; two postoculars; chin covered with scales, with no other shields but the mental and labials. Forty-three to forty-seven series of scales round the neck. Scales rather small, much imbricate, keeled, each keel being interrupted in the middle. The ventral shields are replaced by two series of smooth scales, not larger than the scales of the adjoining series, the scales of the two ventral series being arranged opposite to each other. Young specimens and adult males with broad black cross bands, which either extend only over the back or entirely surround the body. The interspaces between them are generally again divided by a narrow transverse black streak or series of black spots. Old females nearly entirely uniform greyish above and whitish below.

I have examined eight specimens of this species, of different ages, and among them the types of *H. stokesii* and *H. annulatus*. A very large and old female is 61 inches long, $4\frac{1}{2}$ inches high, and has 10 inches in its greatest circumference. It is not rare on the northern coasts of Australia, but its occurrence in the Chinese seas and in the East Indian Archipelago (Singapore) is rather doubtful.

HYDROPHIS MAJOR. (Plate XXV. fig. G.)

Hydrus major, *Shaw*, *Zool.* iii. p. 558, descript. pars & tab. 124.

Pelamis shavii, *Merr.* *Tent.* p. 139.

Hydrophis mentalis, *Gray*, *Zool. Misc.* p. 62.

Head rather short and broad; neck and body of moderate length. Only one labial shield below the eye; one postocular; three temporal shields on the side of each occipital. Two pairs of small chin-shields, the anterior of which are in contact with each other. Rostral shield of moderate size, as broad as high, with a small lobule, and without notches below. Thirty-one series of scales round the neck. Scales much imbricate, keeled, those on the highest part of the body as long as high, rounded behind. The belly is covered with scales, not different from those of the adjoining series; there are only a few ventral shields irregu-

larly disposed along the ventral line; 236 transverse series of scales between the throat and the vent. Four large anal shields; tail covered with rhombic scales larger than those of the body; terminal scale of the tail small. Back of the trunk with thirty-one large rhombic black spots, rather broader than the interspaces between them, and not extending downwards to the middle of the sides.

The typical specimen is the only individual which I have examined; it has been preserved in spirits for a long time and is much bleached; it is a male, with a thick and elevated tail, said to be from the Indian Ocean, and 44 inches long, the cleft of the mouth measuring 10 lines, and the tail $4\frac{1}{2}$ inches. Shaw has confounded this species with *H. stokesii*: the larger specimen "more than 3 feet long," which also has been figured by him, must be considered as the type, to which the name of "*major*" properly belongs. We have given an upper and a lateral view of its head, of the natural size. A second specimen with the accidental "strictures of the tail," and also preserved in the British Museum, is a *H. stokesii*.

HYDROPHIS ROBUSTA.

Hydrophis nigrocineta, Schleg. *Phys. Serp.* ii. p. 505. pl. 18. figs. 8-10 (adult specimens) (not synon.). Fischer, *Abhandl. Naturw. Hamb.* iii. p. 46. taf. 1 (not synon.).

Head of moderate size and width; neck and body not elongate. Two or three upper labials below the orbit; one postocular; anterior temporal shield large; two pairs of chin-shields, which are in contact with one another. Thirty-one series of scales round the neck. Scales slightly imbricate, each with a subcentral tubercle; those on the highest part of the body are rounded or subtruncated behind, as high as long. Ventrals twice or thrice as broad as the scales of the adjoining series, smooth, 310 in number. Terminal scale of the tail rather large. Trunk with thirty-five narrow, distant, black rings, extending round the belly, sometimes interrupted on the side and dilated on the back; head without markings in the adult; throat and belly whitish.

This snake, of which we have examined two adult examples, 6 feet long, is found on the coasts of the mainland of India as well as in the Archipelago. It has been confounded with other species by all the previous herpetologists. The figure given by Fischer is very recognizable.

HYDROPHIS BELCHERI.

Aturia belcheri, Gray, *Viper. Snakes*, p. 46.

Head of moderate width and size; neck not very slender, body of moderate length. Rostral shield nearly as broad as long; only the fourth upper labial forms the lower part of the orbit; two postoculars; three temporal shields on the side of each occipital. Two pairs of chin-shields, which are in contact with one another. Twenty-five series of scales round

the neck. Scales but little imbricate, subtruncated behind, those on the highest part of the body as broad as long, each with a short keel. Ventrals 317 in number, more than twice as broad as the scales of the adjoining series, without keel or tubercle. Four large anal shields. The tail terminates in a very large, forked scale. Back brownish olive, with blackish cross bands anteriorly, separated by yellowish transverse streaks; the bands become very indistinct towards the middle of the length of the animal. Head and throat blackish; a horseshoe-like yellowish mark on the crown of the head, resting with its convex anterior portion on the frontal shields. Sides and belly yellowish.

Only the typical specimen of this species is known; it is from New Guinea, and 34 inches long, the cleft of the mouth measuring $\frac{1}{2}$ inch, the tail $3\frac{1}{4}$ inches.

HYDROPHIS CÆRULESCENS. (Plate XXV. figs. C, C'.)

Hydrus cœrulescens, Shaw, *Zool.* iii. p. 561.

Hydrophis cœrulescens, Gray, *Zool. Misc.* p. 62.

— *hybrida*, Schleg. *Abbildg.* p. 115. taf. 37. *Fischer, Abhandl. Naturw. Hamb.* iii. p. 74.

Head rather small, of moderate width; neck and body somewhat elongate; eye small. One labial shield below the eye; one postocular; three or four small temporal shields on the side of each occipital, the anterior being the largest; two pairs of small chin-shields, the posterior of which are separated from each other by small scales. Thirty-seven to thirty-eight series of scales round the neck. Scales slightly imbricate, strongly keeled, those on the posterior half of the body as high as long, and subtruncated behind. Ventral shields distinct, but not much larger than the scales of the adjoining series, bituberculate, 294(-300)-309 in number; six preanal shields, the outer of which are the larger. Terminal scale of the tail small. Yellowish, with from thirty-seven to forty-six rhombic blackish spots on the back; they are broadest on the vertebral line, nearly touching one another; they either do not descend to the middle of the side, or are continued to the belly as faint greyish cross bands.

I have examined ten specimens of this species, one of which is the type of *H. cœrulescens*, Shaw. They are from the Bay of Bengal and from Pinang; Schlegel's *H. hybridus* was brought from Java. The largest specimen is 2 feet long.

We have given an upper and a lateral view of the head (fig. C), of the natural size; and a side view of a portion of the body (fig. C').

HYDROPHIS ASPERA.

Hydrophis aspera, Gray, *Viper. Snakes*, p. 55.

Head of moderate size and width; neck and body somewhat elongate. Two labial shields below the eye; rostral shield of moderate size, rather broader than high; two postoculars; three temporal shields on the side of each occipital, the anterior being the largest; two pairs of chin-shields, which are in contact with one another. Thirty series of scales round the

neck. Scales but very little imbricate, strongly keeled, the keel of each scale having two tubercular prominences; the scales on the posterior half of the body are as high as long, and subtruncated behind. Ventral shields 340 in number, twice as broad as the scales of the adjoining series, and each with several minute tubercles on each side. Terminal scale of the tail of moderate size. Dirty yellowish: trunk with forty-seven large rhombic black cross bands, broadest and nearly touching one another on the back, tapering and faint on the sides. Upper side of the head uniform blackish in the adult.

The typical specimen is the only example I have seen of this species; it is said to be from Singapore, and 43 inches long, the tail measuring $4\frac{1}{2}$ inches. It is a male, and has a thick tail.

HYDROPHIS SPIRALIS. (Plate XXV. fig. D.)

?? Shiddil, *Russell, Ind. Serp.* ii. tab. 12.

Hydrus spiralis, *Shaw, Zool.* iii. p. 564. tab. 125.

Hydrophis melanurus, *Wagl. Ic. Amph.* tab. 3.

— *spiralis*, *Gray, Viper. Snakes*, p. 54.

Head of moderate size and width; neck and body somewhat elongate. The third and fourth labial shields enter the orbit; one postocular; three temporal shields on the side of each occipital, the anterior being the largest. Two pairs of chin-shields, which are in contact with one another. Twenty-nine to thirty-three series of scales round the neck. Scales imbricate, each with a central tubercle, those on the posterior half of the trunk as high as long, and rounded behind. Ventral shields 320 in number, twice or thrice as large as the scales of the adjoining series, nearly all being undivided. Preanal shields of moderate size. Trunk surrounded by from forty-two to forty-eight black rings, which are scarcely broader on the back than on the sides and belly, and about half as broad as the interspaces of the ground-colour. A series of round black spots alternating with the black rings, along the vertebral line; this series commences either before, or on, or behind the middle of the length of the animal. Head black above, with a horseshoe-shaped yellow mark, the convexity of which rests on the frontal shields; the lower half of the upper lip, the chin, and throat yellowish; belly black, at least along its anterior half; posterior part of the tail black.

I have examined seven specimens of this species, which has been confounded with other sea-snakes by Schlegel and Fischer. Five of them, including the typical specimen, are young, showing an open umbilical aperture, and 15 inches long; the others are adult, one being 6 feet long. They are from the Indian Ocean, but the localities where they were captured are not mentioned. It is extremely doubtful whether Russell's *Shiddil* is identical with this species; it differs not only in coloration, but it appears to be also of a much stouter habit.

We have given three views of the head, and one of a portion of the body, to show the coloration. These figures are taken from a young specimen, and are of the natural size.

HYDROPHIS CYANOCINCTA. *The Chittul.*

Russell, Ind. Serp. ii. tab. 9.

Hydrophis cyanocinctus, Daud. Rept. vii. p. 383.

Léiosélasme striée, Lacép. Ann. Mus. iv. p. 198. pl. 57. fig. 1.

Hydrophis striata, Schleg. Faun. Japon. Rept. p. 89. pl. 7, and *Phys. Serp.* ii. p. 502. pl. 18. figs. 4 & 5. *Fischer, Abhandl. Naturw. Hamb.* 1850, iii. p. 41. *Dum. & Bibr. Erpét. gén.* vii. p. 1347.

— *sublaevis, Gray, Zool. Misc.* p. 62. *Tennent, Nat. Hist. Ceylon,* p. 311 c. fig.

— *subannulata, Gray, Viper. Snakes,* p. 54.

Hydrus striatus, Cantor, Mal. Rept. p. 126.

Head of moderate size and width; neck and body rather elongate; generally two labial shields below the eye; two postoculars (exceptionally confluent into one); two or more temporal shields on the side of each occipital. Two pairs of chin-shields, the anterior of which are in contact with each other. Twenty-nine to thirty-three series of scales round the neck. Scales slightly imbricate, rhombic, faintly keeled, those on the highest part of the body rather longer than high. Ventrals 320–360–406–426, twice or thrice as large as the scales of the adjoining series; almost all are entire, not longitudinally divided, and bitubercular; four anal shields, the outer of which are larger than the inner; terminal scale of the tail rather small, or of moderate size. Greenish olive on the back, yellowish on the sides and belly; trunk with from fifty to seventy-five black cross bands, which are broadest on the back, and broader than the interspaces of the ground-colour; they are narrower on the sides, sometimes disappearing altogether with age on the sides and belly, or visible only as irregular spots on the ventral shields. In young and half-grown specimens they surround the body entirely, and are sometimes joined by a black band running along the whole line of the ventral shields. The head is greenish olive above and yellowish on the sides; in the young black, variegated with yellow, the yellow colour sometimes forming a frontal and temporal band.

This is one of the commonest sea-snakes, occurring on the coasts of Ceylon, Madras, in the Bay of Bengal, in the East Indian Archipelago, and in the seas of China and Japan. It attains to a length of more than 6 feet. Old males have a remarkably thick and rounded tail.

HYDROPHIS MELANOSOMA. (Plate XXV. fig. E.)

Head rather small and short; neck and body elongate. Two labial shields below the eye; one postocular; only two large temporal shields on the side of each occipital. Two pairs of chin-shields, the anterior of which are in contact with each other, the posterior being separated by one or two small scales. Twenty-seven series of scales round the neck. Scales distinctly imbricate, each with a smooth strong keel; those on the highest part of the body as high as long. Ventrals 335, twice as large as the scales of the adjoining series; all are entire, and the middle and posterior are provided with a pair of keels; four anal shields, the outer of which are rather larger than the inner. Terminal scale of the tail very small. The black rings of the body are so broad that the yellowish ground-colour only appears in narrow

vertical stripes on the side; there are sixty of these black rings; they are more or less confluent on the belly, and separated by narrow blackish-green interspaces on the back. Head nearly uniform blackish.

I have examined only one example, which is in the collection of the Royal College of Surgeons. It is a female with six eggs in the oviduct, and 49 inches long. Nothing is known about its habitat. We have given three views of the head, and one of a portion of the body, all of the natural size.

HYDROPHIS SUBCINCTA. (Plate XXV. fig. F.)

Hydrophis subcinctus, Gray, *Zool. Misc.* p. 63.

Head rather small and narrow, its length being not quite twice its width; neck slender, not quite one-fourth of the total length; body rather elongate. Rostral shield broader than high; only the fourth upper labial forms the lower part of the orbit; two postoculars; two large temporal shields on the side of each occipital. Two pairs of chin-shields, which are in contact with one another. Twenty-three series of scales round the neck. Scales imbricate, rhombic, keeled, as high as long; ventrals distinct, but not twice as large as the scales of the adjoining series; the posterior are longitudinally divided into two; they are 342 in number, and each has a pair of small tubercles; four anal shields of moderate size. Terminal scale of the tail small. Trunk with forty-one broad dark cross bands, about as broad as the interspaces, not extending downwards to the middle of the side; a series of small, roundish, blackish spots along the lower part of the sides.

The typical specimen is the only one I have seen of this species; it is said to be from the Indian Ocean, and is very much bleached; its length is 46 inches, the cleft of the mouth measuring $\frac{1}{2}$ inch, the tail 4 inches.

HYDROPHIS NIGROCINCTA. (Plate XXV. fig. L.)

Russell, Ind. Serp. ii. tab. 6.

Hydrophis nigrocinctus, Daud. *Hist. Rept.* vii. p. 380.

Eulhydris nigrocinctus, Merr. *Tent.* p. 140.

Head small; neck slender, its length being about one-fourth of the total; body moderately elongate. Rostral shield rather broader than long; only the fourth upper labial forms the lower part of the orbit; two postoculars; three temporal shields on the side of each occipital. Two pairs of chin-shields, the anterior of which are in contact with each other. Twenty-seven to twenty-nine series of scales round the neck. Scales imbricate, rhombic, keeled, those on the highest part of the body as broad as long. Ventrals distinct, not quite twice as broad as the scales of the adjoining series, smooth, 320-331 in number. Four large anal shields. The tail terminates in a large scale. The trunk is encircled by 43-(53-)-61 complete

rings of black colour. The width of these rings is equal on the sides and on the belly; on the vertebral line only they are a little broader; they are narrower than the interspaces, which occupy from four to five transverse series of scales, whilst a black ring occupies only three. The interspaces are greenish olive on the back, yellowish on the sides and on the belly. The crown of the head and the upper lip are blackish, a yellow band running along the whole upper margin of the head; lower jaw whitish. Tail with from nine to eleven black cross bars.

I have examined three specimens of this species; they are from the coast of Bengal; the largest is 40 inches long, the cleft of the mouth measuring $\frac{1}{4}$ inch, the tail 4 inches. We have given three views of the head, and one of a portion of the body.

HYDROPHIS ELEGANS. (Plate XXV. figs. K, K'.)

Hydrophis dolia, Gray, *Zool. Misc.* p. 62, and *Viper. Snakes*, p. 51 (not synon.).
Aturia elegans, Gray, *Zool. Misc.* p. 61.

Head rather small and narrow; neck slender, less than one-third of the total length; body elongate. Rostral shield as high as, or higher than, broad; the labial below the eye is split into two or three pieces; two postoculars. Two pairs of chin-shields, the anterior of which are in contact with each other. Twenty-eight series of scales round the neck. Scales imbricate, keeled, rhombic, those on the highest part of the body about as high as long. Ventrals twice or thrice as broad as the scales of the adjoining series, bitubercular, from 330-415 in number. Six anal shields. Trunk with from forty-two to forty-eight black or blackish-olive cross bands, rounded laterally, extending downwards to the middle of the sides, rather broader than the interspaces of the ground-colour; belly with a narrow black longitudinal band. Head entirely black, separated from the first cross band by a narrow white ring. The *young* specimen has a transverse series of small black spots in the middle of each interspace between the black cross bands; and an irregular series of small round black spots runs along each side of the belly.

I have seen three specimens of this species, an adult, a half-grown, and a young, the latter being the typical specimen of Gray's *Aturia elegans*. Two are from the north coast of Australia, and one from New South Wales. The largest is 50 inches long, the cleft of the mouth measuring 7 lines, and the tail $3\frac{1}{2}$ inches. We have given three views of the head of the old example, and one of a portion of the body of the young (*Aturia elegans*).

HYDROPHIS TORQUATA. (Plate XXV. fig. H.)

? *Polyodontes annulatus*, Less., in *Bélang. Voy. Ind. Zool. Rept.* p. 325. pl. 4 (bad figure).
Hydrophis nigrocineta (young), *Schleg. Phys. Serp.* ii. p. 506. pl. 18. figs. 11 & 12 (not synon.).
Hydrus nigrocinetus, Cantor, *Mal. Rept.* p. 128.

Head rather small and narrow, its length being nearly twice its width; neck slender, less

than one-third of the total length; body rather elongate. Rostral shield broader than high; only the fourth upper labial forms the lower part of the orbit; one postocular; two large temporal shields on the side of each occipital. Two pairs of chin-shields, which are in contact with one another. Thirty-three to thirty-five series of scales round the neck. Scales imbricate, keeled; those on the highest part of the body rather longer than broad, with the apex slightly truncated. Ventrals twice as broad as the scales of the adjoining series, bicarinate, 283-285 in number. Four anal shields, the outer of which are very large. Terminal scale of the tail of moderate size. Trunk with from fifty to fifty-two blackish-olive cross bands, broadest on the back, tapering on the sides, and becoming very faint on the belly. The width of the greenish interspaces on the back equals that of the broadest part of the cross bands; the cross bands on the neck are not narrower on the sides than on the back; an elongate irregular black spot occupies the crown of the head forwards to the frontal shields, and is separated from the black snout and upper lip by a yellow band. Lower jaw and throat blackish; belly white.

The four specimens which I have examined of this species are evidently young, the largest being only 23 inches long. They are from Cantor's collection, who procured them on the coast of Pinang.

HYDROPHIS CHLORIS.

Russell, Ind. Serp. ii. pl. 7.

Hydrophis cloris, Daud. Hist. Rept. vii. p. 377.

— *obscura, Gray, Viper. Snakes, p. 49 (not synon.).*

? *Hydrophis gracilis, Cantor, Trans. Zool. Soc. ii. pl. 56.*

Head very small, of moderate width; neck very slender, the length of the thin part of the body being more than one-third of the total. Rostral shield very small, much broader than long; one postocular; the third upper labial is not in contact with the nasal. Two pairs of chin-shields, in contact with each other. Thirty-one to thirty-three series of scales round the neck; scales on the back with a faint keel, and with a small tubercle near the apex. Ventral shields distinct, especially on the thin portion of the body, but not much larger than the scales of the adjoining series, 473-500 in number. Four anal shields, the outer of which are very large. Trunk greenish olive above, yellowish on the side and below: from fifty-nine to sixty-seven rhombic blackish bands across the back, which are much narrower and fainter on the sides, and extend round the belly; their angles on the vertebral line are sometimes confluent, especially on the anterior part of the body, where the yellowish ground-colour between the cross bands is sometimes reduced to round spots disposed in pairs. Head and anterior part of the belly entirely black. Young specimens have the markings of a deep black.

I have examined three adult specimens of this species and numerous young ones; they are from the coasts of Madras and Pinang: Russell's specimen came from the coast of the Sunderbunds. Our largest specimen is 40 inches long, the cleft of the mouth measuring $4\frac{1}{2}$ lines, and the tail 3 inches.

HYDROPHIS LINDSAYI.

? *Hydrophis gracilis*, *Schleg. Phys. Serp.* ii. p. 507. pl. 18. figs. 11 & 12 (not synon.).

Aturia lindsayi, *Gray, Zool. Misc.* p. 61.

Hydrophis lindsayi, *Gray, Viper. Snakes*, p. 50.

Head very small, of moderate width; neck very slender, the length of the thin part of the body being one-third of the total. Rostral shield small, as long as broad; one postocular; the third upper labial is not in contact with the nasal. Two pairs of chin-shields, which are in contact with each other. Thirty-one to thirty-three series of scales round the neck. Scales on the back slightly keeled, the central keel terminating in a small tubercle. Ventral shields distinct, especially on the thin portion of the body, where they are nearly twice as large as the scales of the adjoining series; they are from 345-(390-424)-449 in number, very few of which are longitudinally divided into two. Four anal shields, the outer of which are very large. Trunk greenish olive above, yellowish on the side and below; from forty-eight to fifty-eight broad blackish bands across the back; those on the neck form complete rings, but the middle and posterior extend only to the middle of the side; they are about twice as broad as the interspaces between them. The whole head and the anterior part of the belly are black. In the *young* all the bands encircle the belly, and most of them are subinterrupted on the side.

This species is very similar to *H. chloris*, but has a considerably shorter neck and a smaller number of cross bands and ventral shields. I have examined four specimens, one of which is the type; they are said to be from the coasts of China, Siam, and Malabar. The largest is 39 inches long, the cleft of the mouth measuring 5 lines, and the tail 3 inches.

HYDROPHIS ATRICEPS. (Plate XXV. figs. I, I'.)

Head small, not quite twice as long as broad; neck slender, its length being nearly one-third of the total. Rostral shield of moderate size, as broad as long; two postoculars; the third upper labial is not in contact with the nasal. Two large temporals on the side of each occipital. Two pairs of chin-shields, which are in contact with each other. Twenty-six to twenty-eight series of scales round the neck. Scales slightly imbricate, with the apex subtruncated, and with a small tubercle near the apex. Ventral shields 376 in number; only those on the thin portion of the body are twice as large as the scales of the adjoining series; the posterior are distinct, undivided, bitubercular. Four anal shields, the outer of which are very large. Back of the trunk with from sixty to sixty-four rhombic blackish-olive cross bands, which nearly touch one another in the vertebral line; sides and belly yellowish white; the head is entirely black.

I have seen two examples of this species; they are in the British Museum, and said to be from Siam; one is 31 inches long, the cleft of the mouth measuring 4 lines, the tail 3 inches. We have given three views of its head, and one of a portion of its body (I'), all of the natural size.

HYDROPHIS LATIFASCIATA. (Plate XXV. fig. T.)

Head small, not quite twice as long as broad; neck very slender, its length being one-third of the total. Rostral shield quadrangular, broader than long; one postocular; the third upper labial is not in contact with the nasal; two large temporal shields along the side of each occipital, the anterior entering the labial margin. Two pairs of small chin-shields, the anterior of which are in contact with each other. Twenty-three series of scales round the neck. Scales imbricate, keeled, those on the highest part of the body rounded, as high as long. Ventral shields distinct: the anterior twice as broad as the scales of the adjoining series; the posterior bicarinate, 322 in number. Four anal shields, the outer of which are the larger. The tail terminates in a very large scale. Trunk with thirty-eight broad black cross bands, which are confluent on the back as well as on the belly, and darker below than above. The yellowish ground-colour appears only as a lateral series of large rounded spots. Head black, with a Π -shaped yellow mark above.

I have seen only a single example of this species; it is in the British Museum, and was sent from the coast of Mergui; its total length is 30 inches, the cleft of the mouth being $\frac{3}{4}$ inch, and the tail 3 inches.

HYDROPHIS CORONATA. (Plate XXV. figs. M, M'.)

Hydrophis hardwickii, Gray, *MS.* (not *Lapemis hardwickii*, Gray).

— *fasciata*, Gray, *Viper. Snakes*, p. 50, specimens *a* & *b* (not synon.).

Head very small, twice as long as broad; neck very slender, its length being more than one-third of the total. Rostral shield small, broader than long; one postocular; the third upper labial is not in contact with the nasal. Two pairs of chin-shields, which are in contact with each other. Nineteen to twenty-three series of scales round the neck. Scales imbricate: those on the highest part of the body higher than long, those on the sides with a small tubercle, those on the back with a keel. Ventral shields very distinct, nearly twice as large as the scales of the adjoining series, 321–337 in number, each with two small tubercles. Four anal shields, the outer of which are rather larger than the others. Trunk with from fifty-three to fifty-nine complete blackish rings, which are broader than the interspaces of the yellowish-olive ground-colour. Head and ventral side of the thin neck-like portion of the body black; the former with a yellow horseshoe-shaped mark across the frontals and nasals, and extending backwards over the superciliary edge to the temple. Tail with ten or eleven blackish cross bars.

I have examined two specimens of this species; they are from the coast of Bengal. The larger is 37 inches long, the cleft of the mouth measuring 4 lines, the tail $3\frac{1}{4}$ inches. We have given an upper and lateral view of its head and one of a portion of its body (M'), all of the natural size.

HYDROPHIS DIADEMA. (Plate XXV. fig. 8.)

Head very small and narrow, more than twice as long as broad; neck very slender, its length being rather more than one-third of the total. Rostral shield of moderate size, much broader than long; two postoculars; the third upper labial is not in contact with the nasal. Two large temporals on the side of each occipital. Two pairs of chin-shields, which are in contact with each other. Thirty-three series of scales round the neck. Scales slightly imbricate, with the apex truncated, and with a small central tubercle. Ventral shields distinct, but only those on the thin portion of the body are twice as large as the scales of the adjoining series; they are 318 in number. Four anal shields, the outer of which are very large. Trunk with sixty-two blackish rings, which are broader than the interspaces between them, broadest on the back, and narrow and much paler on the belly. Head blackish above, with a yellow band over each superciliary and the temple; the two bands convergent anteriorly, and meeting on the frontal shields. Lower jaw and belly yellowish; tail with from seven to nine blackish cross bars.

The three specimens which I have examined are in the British Museum; it is not known where they were captured; the largest is 32 inches long, the cleft of the mouth measuring 5 lines, the tail $3\frac{3}{4}$ inches.

HYDROPHIS GRACILIS.

Russell, ii. tab. 8.

Hydrus gracilis, *Shaw*, *Zool.* iii. p. 560.

Hydrophis obscurus, *Daud.* *Rept.* vii. p. 375.

? *Microcephalophis gracilis*, *Less.*, in *Belang. Voy. Ind. Orient.* *Atl. Rept.* pl. 3.

Microcephalophis gracilis, *Gray*, *Viper. Snakes*, p. 46.

Thalassophis microcephala, *Schmidt*, *Abhandl. Naturw. Hamb.* ii. p. 78. taf. 2.

Hydrophis microcephala, *Fischer*, *ibid.* iii. p. 52.

Head very small, narrow; neck very slender. Rostral shield cutting in front; one postocular; the third upper labial not in contact with the nasal; two large temporal shields along the side of the occipital. Two pairs of chin-shields, in contact with each other. Nineteen to twenty-one series of scales round the neck; scales provided with central tubercles. The ventral shields are twice as large as the scales of the adjoining series on the slender anterior part of the body; the ventral shields of the compressed part are split into two, both halves being first opposite to each other, and alternate posteriorly. They are 228-(247-254)-294 in number; six small anal shields. Anterior part of the body surrounded by blackish rings, which become very indistinct posteriorly. The hinder half of the body is greenish olive above and whitish below; sometimes traces of darker cross bands extending downwards to the belly are visible. Throat, anterior ventral shields, and crown of the head blackish, sides of the head and snout lighter.

A young specimen has forty-one rhombic black cross bands, continued on to the belly, but subinterrupted on the sides; head, ventral shields, and posterior part of the tail black.

I have examined five specimens of this species, one of which is the type of Shaw's *H. gracilis*. Two of them are from Madras; those mentioned by Schmidt and Fischer from Java. The largest is 33 inches long, the cleft of the mouth measuring half an inch, the length of the tail $2\frac{3}{4}$ inches.

HYDROPHIS FASCIATA. (Plate XXV. figs. Q, Q'.)

Russell, Ind. Serp. i. taf. 44.

Hydrus fasciatus, Schneid. Hist. Amph. p. 241. *Shaw, Zool.* iii. p. 563.

Anguis mamillaris, Daud. Hist. Rept. vii. p. 340.

Head very small, of moderate width; neck slender, but the thin part of the body is much less than one-half of the total length. Upper jaw slightly projecting beyond the lower; rostral shield broader than long, not cutting in front; two postoculars; the third upper labial is not in contact with the nasal. Two pairs of chin-shields, in contact with each other. Twenty-five series of scales round the neck; scales with a small central tubercle, ventral shields with two. The ventral shields are twice as large as the scales of the adjoining series, and remain undivided and distinct to the vent; they are 316 in number: six small anal shields. Trunk with forty-three deep-black rings which are well defined, broadest on the back, and nearly twice as broad as the yellow interspaces; on the neck the black rings are, comparatively, still broader, but never confluent. All the rings are confluent on the belly, the lower parts from the chin to the extremity of the tail being deep black; head uniform black, with two or three yellowish dots behind the eye; tail black, with three short yellowish bars across its basal half.

Russell's specimen was from Vizagapatam: our example (the only one I have seen) was taken on the same coast; it is a male, 26 inches long, the cleft of the mouth measuring 5 lines, and the tail $2\frac{3}{4}$ inches. A small specimen in the British Museum, mentioned in Dr. Gray's Catalogue of Viperine Snakes, p. 51, as *Hydrophis fasciata*, Shaw, and believed by him to be Russell's typical specimen, differs from Russell's description as well as from the figure, and is probably a young example of *H. cantoris*. Shaw's description is evidently not taken from the specimen in the British Museum, but is merely a repetition of the account given by Russell. We have given three views of the head, and one of a portion of the body, of the natural size.

HYDROPHIS CANTORIS. (Plate XXV. fig. U.)

Hydrus gracilis, Cantor, Mal. Rept. p. 130 (not synon.).

? *Liopola fasciata, Gray, Zool. Misc.* p. 60 (young) (not *Schneid.* nor *Shaw*).

Head very small, narrow; neck very slender, the thin part of the body forming nearly one-half of the total length. Upper jaw scarcely projecting beyond the lower; rostral shield narrow, produced backwards, not cutting in front; one postocular; the third upper labial in contact with the nasal; two large temporal shields along the side of the occipital. Two

pairs of chin-shields, in contact with each other. Twenty-three series of scales round the neck; scales smooth in young examples, provided with central tubercles in old ones; the tubercles are minute, and each scale on the belly has a group of from two to four in the centre. The ventral shields of the slender anterior part of the body are twice as large as the scales of the adjoining series; those of the compressed part are split into two, both halves being opposite to each other; they are from 412-440 in number; six small anal shields. The slender part of the body is surrounded by from twenty-eight to thirty blackish rings, which are more or less confluent on the back, the belly being entirely black; large, rounded, yellowish-green spots separate the cross bands from one another on the sides. There are no distinct markings on the compressed part of the body, the back of which is uniform dark greenish olive, the sides yellowish, the ventral shields blackish; the tail, again, has ten blackish vertical bars.

The *young* has fifty-three blackish cross bands on the trunk, the anterior of which entirely surround the neck, whilst the posterior extend to the sides only.

This species is founded on the largest specimen of those from which Cantor made his description of *H. gracilis*; as we have received the whole of his collection, I was enabled to convince myself that he has confounded several species under that name. I have seen only two examples of this remarkable species, well distinguished by the exceedingly long neck, &c. The larger is from Pinang, a male, and 42 inches long, the cleft of the mouth measuring 5 lines, and the tail 4 inches. The other example is young.

HYDROPHIS LAPEMOIDES.

Aturia lapemoides, Gray, *Viper. Snakes*, p. 46.

Head narrow, elongate; body slender anteriorly, moderately elongate posteriorly. Two pairs of chin-shields, the anterior of which are in contact with each other. Two postoculars; thirty to thirty-two series of scales round the neck. Ventral shields twice as broad as the scales of the adjoining series, 350 in number. Four small preanal shields. Scales of the young smooth, of the adult with a short central keel. Thirty-seven to forty-three black rings round the body, broadest on the back, narrowest on the side, and again somewhat dilated on the belly; they occupy nearly as much space as the ground-colour: ventral shields blackish: head black above, with a yellow band on each side, the two bands convergent on the nasal plates. Lower parts of the head greyish. Tail black, with a white ring round its base, and sometimes with some other half-rings across its back.

I have seen only two examples: one, from Ceylon, is the typical specimen, and 24 inches long (tail $2\frac{1}{4}$ inches, cleft of the mouth 7 lines); the other is young, and from Madras.

HYDROPHIS LONGICEPS. (Plate XXV. fig. O.)

Chitulia fasciata, Gray, *Viper. Snakes*, p. 56.

Head narrow, much elongate, twice as long as broad; body rather slender, more especially

in its anterior portion. Two pairs of chin-shields, both of which are in contact with each other. The first upper temporal much longer than high. Two postoculars. Thirty series of scales round the neck. Ventral shields twice as broad as the scales of the adjoining series, 271 in number. Six præanal shields, the outer being much larger than the inner ones. Scales keeled. Body with fifty-three broad blackish-olive cross bands, rounded and narrower on the sides than on the back, not extending downwards to the middle of the sides, separated from one another by interspaces, the width of which is one-third of that of the bands. Sides and all the lower parts uniform whitish. Head uniform greenish olive above, supraciliary edge whitish. Tail with eleven blackish vertical bars.

The typical specimen, from the Indian Ocean, is the only example I have seen of this species; it is 31 inches long, the tail measuring $3\frac{1}{2}$ inches, the cleft of the mouth $\frac{3}{4}$ inch.

HYDROPHIS STRICTICOLLIS. (Plate XXV. fig. R.)

Head narrow, elongate, not quite twice as long as broad; body slender, especially in its anterior portion. Two pairs of chin-shields, both of which are in contact with each other. Only one anterior temporal, which is as high as long. One postocular. Thirty-four series of scales round the neck. Ventral shields distinct, but only the anterior are twice as broad as the scales of the adjoining series; they are 398 in number. Six small præanal shields. Scales smooth in young specimens. Body with fifty-five blackish rings, not quite as broad as the yellowish ground-colour between them; they are rather broader and darker on the back than on the belly, and sometimes subinterrupted in the vertebral and ventral line. Head yellow above, with irregular blackish confluent spots; whitish below. Tail with eleven blackish vertical bars.

I have examined only one young specimen, which had been transferred from the collection of the East India Company to that of the British Museum; it is $13\frac{1}{2}$ inches long, the tail measuring $1\frac{1}{4}$ inch, the cleft of the mouth $\frac{5}{8}$ inch.

HYDROPHIS ORNATA. (Plate XXV. fig. V.)

Aturia ornata, Gray, *Zool. Misc.* p. 61.

— — —, var. 1, Gray, *Viper. Snakes*, p. 45.

Chitulia inornata, Gray, *Viper. Snakes*, p. 56.

Thalassophis schlegelii, Schmidt, *Abhandl. Naturw. Hamb.* ii. p. 83. tab. 5.

Hydrophis schlegelii, Fischer, *Abhandl. Naturw. Hamb.* iii. p. 50.

— *lævis*, Lütken, *Naturh. Foren. Vidensk. Meddel.* 1862, taf. 1. fig. 6.

Head rather narrow, snout somewhat elongate; body of moderate length, with its anterior part rather elongate. Two pairs of chin-shields, the anterior of which are in contact with each other, the posterior being separated by one or two series of smaller scales. The first upper temporal much longer than high. Two postoculars; thirty-five series of scales round the neck. Ventral shields twice as broad as the scales of the adjoining series, 252-260 in

number. Six preanal shields, the outer being much larger than the inner ones. Scales of the young smooth, of the adult with a central tubercle. The young with forty-two blackish cross bands, tapering on the side and extending downwards not quite to the middle of the side; the anterior cross bands are subquadrangular. These bands are separated by very narrow interspaces of the yellowish ground-colour; a narrow, cuneiform blackish spot, with its point directed upwards, is always intercalated between the lateral ends of two of the cross bands; sides whitish, with a narrow pale-blackish vertical bar below each of the cross bands. Head uniform blackish olive above, with a whitish supraciliary edge. Tail black, with narrow whitish cross bars. The black dorsal bands become confluent in age, and old specimens are uniformly blackish olive above and whitish below; scarcely any traces of the light transverse stripes on the neck remain.

I have examined four specimens of this species, among which are the types of *Aturia ornata* and *Chitulia inornata*; all are said to be from the Indian Ocean; the largest is 30 inches long, the cleft of the mouth being $\frac{1}{2}$ inch, the tail 3 inches. We have given three figures of the head of the typical specimen of *Chitulia inornata*.

HYDROPHIS ELLIOTI. (Plate XXV. fig. N.)

Aturia ornata, var. 2, Gray, *Viper. Snakes*, p. 45.

Head rather thick and short, with the snout of moderate length. Body of moderate length, with its anterior part not slender. Two pairs of chin-shields, the anterior of which are in contact with each other. The first upper temporal is not much longer than high. Two postoculars; thirty-five to thirty-seven series of scales round the neck. Ventral shields nearly twice as broad as the scales of the adjoining series, 253-300 in number. Six preanal shields, the outer being much larger than the inner ones. Scales of the young smooth, of the adult with a central tubercle; ventral shields with two tubercles. Maxillary with nine closely-set teeth behind the fang. Thirty-eight to forty-one broad blackish-olive bands across the back, rounded on the sides, scarcely extending downwards to the middle of the side of the body, separated by very narrow whitish transverse stripes. The young with a series of rounded blackish-olive spots along the lower half of the side, the spots alternating with the cross bands. Head uniform greenish olive in the adult, reticulated with yellow above in the young. All the lower parts and, in the adult, the sides whitish. Tail with narrow yellowish cross bands.

This species is distinguished from *H. ornata* by a shorter head, stouter body, and by the coloration. I have examined four specimens: one male is 49 inches long, tail 5 inches; another adult, from Siam, is 29 inches long, the tail measuring $2\frac{1}{2}$ inches, the cleft of the mouth $\frac{3}{4}$ inch. The others are young, from Madras and Ceylon. I have named the species after Walter Elliot, Esq.

HYDROPHIS PACHYCERCUS.

Hydrophis pachycercus, Fischer, *Abhandl. Geb. Naturwiss. Hamb.* iii. p. 44. taf. 2.

Head and body of moderate width and length. Two pairs of chin-shields, both of which are in contact with each other. Two postoculars. The third upper labial is not in contact with the nasal, but enters the orbit; the fourth and fifth labials are below the orbit. The first upper temporal is longer than high. Twenty-eight series of scales round the neck. Ventral shields more than twice as broad as the scales of the adjoining series, 258 in number. Four præanal shields, the outer being larger than the inner. Scales with a strong tubercular keel; ventral shields with one or two pairs of tubercles. Body brownish yellow above, with very indistinct cross bands; sides and belly white. Tail black behind.

The single example I have seen is from the East Indian Archipelago; it is 36 inches long, the tail measuring 9 inches.

HYDROPHIS VIPERINA.

Thalassophis viperina, Schmidt, *Abhandl. Naturw. Hamb.* ii. p. 79. taf. 3.

Disteira præscutata, Dum. & Bibr. *Erpét. gén.* vii. p. 1351.

Hydrophis dolata, Fischer, *Abhandl. Naturw. Hamb.* iii. p. 56.

Head of moderate size and width; neck and body moderately elongate. Nasal shields as broad posteriorly as they are long; the third upper labial does not enter the orbit; two posterior oculars; three temporal shields on the side of each occipital; two large chin-shields, in contact with one another. Twenty-nine series of scales round the neck. Ventral shields 237 in number: the anterior are broad, about six times as broad as the scales of the adjoining series; they decrease in width towards behind, and the posterior are not much larger than the neighbouring scales. Four præanal shields of moderate size. Scales smooth in the young, and keeled in the adult. Back with from thirty-one to thirty-eight rhombic black spots, the anterior of which are sometimes confluent; they are continued on to the belly as blackish vertical bars in young specimens, but these bars disappear with age; head without markings.

Only one young example has been examined by myself; it is from the coast of Madras. The specimen in the Hamburg Museum is said to be from Java.

HYDROPHIS OCELLATA. (Plate XXV. figs. P, P'.)

Hydrophis ocellata, Gray, *Viper. Snakes*, p. 53.

Head rather short and broad; anterior and posterior parts of the body moderately stout; two pairs of chin-shields, the anterior of which are in contact with each other. Two postoculars; thirty-five to forty-one series of scales round the neck. Ventral shields distinct, but not twice as broad as the scales of the adjoining series, 296-334 in number. Six præanal shields, the outer of which are the largest. Scales of the young smooth, of the adult with a short tubercular keel. Back with from thirty-two to thirty-four blackish cross bands, the

anterior of which are quadrangular and separated by straight, very narrow, transverse whitish lines; the middle and posterior are rounded elliptical, each with lighter centre; a smaller transverse blackish spot behind each large elliptical cross band; a series of ovate blackish ocelli, each with lighter centre, runs along the side of the back, the ocelli being alternate with the dorsal bands; two other series of small, round, alternate spots along the lower side; belly with numerous blackish dots. Head uniform brownish olive; tail with two rows of blackish cross bars, the one ascending from the lower side, the other descending from the upper; the bars of both sides alternate with each other.

This beautiful species has been received hitherto from the Australian seas only. I have examined three specimens, the larger of which is 44 inches long (cleft of the mouth $\frac{1}{2}$ inch, tail 5 inches); one of the others is the typical specimen. The three figures of the head and that of a portion of the body (P') are taken from the typical specimen.

HYDROPHIS ANOMALA.

Thalassophis anomala, Schmidt, *Abhandl. Naturw. Hamb.* ii. p. 81. taf. 4.

Hydrophis anomala, Fischer, *ibid.* p. 58.

Head short, thick, obtuse; body rather stout. Shields of the snout broken up into smaller pieces; two pairs of chin-shields, the anterior of which are in contact with each other; two postoculars. The scales are hexagonal, each with a strong white keel; they form thirty-one longitudinal series round the highest part of the body. Ventral shields bicarinate, not larger than the adjoining scales, 247-252 in number. Trunk with twenty-six or twenty-seven large, rhombic, bluish-grey transverse spots.

Two specimens were captured at Samarang, the larger being 32 inches long.

HYDROPHIS CURTA.

Hydrus curtus, Shaw, *Zool.* iii. p. 562.

Lapemis curtus, Gray, *Zool. Misc.* p. 60.

Hydrophis propinquus, Jan, *Iconogr. descr. in Rev. et Mag. Zool.* 1859.

Head short, thick, obtuse; anterior part of the body stout; body not elongate. The occipital shields are always divided into two or more pieces, or entirely broken up into small shields. Two pairs of chin-shields, separated in the middle by small gular scales. Only one postocular. Thirty to thirty-four series of scales round the neck; 209-252 scales in a lateral series between the angle of the mouth and the vent. Ventral shields nearly twice as broad as the scales of the adjoining series, 156-160 in number. Four small preanal shields. Fifty to fifty-three black bands across the back; they are broadest in the middle, nearly touching each other, and tapering on the sides; the yellowish ground-colour between them does not occupy more space than the bands. Generally the bands do not extend downwards to the belly, but sometimes they are continued as faint traces to the ventral shields, which are white, or, in the specimens with longer cross bands, blackish. A more or less distinct yellowish streak on the temple. Tail black, with only two yellow transverse spots at its root.

I have examined six specimens of this species, one of which is the type, described by Shaw. The largest is only 17 inches long, the cleft of the mouth being $\frac{2}{3}$ inch, the tail $1\frac{1}{4}$ inch. Madras is the only well-authenticated locality where it has been found.

HYDROPHIS HARDWICKII. (Plate XXV. fig. W.)

Lapemis hardwickii, Gray, *Zool. Misc.* p. 60, and *Ind. Zool.* c. 6g.

? *Hydrophis pelamoides*, Schleg. *Phys. Serp.* ii. p. 512.

Hydrophis pelamoides, Schleg. *Faun. Japon. Rept.* pl. 9.

Hydrophis pelamoides (part.), Fischer, *Abhandl. Naturw. Hamb.* 1856, iii. p. 64.

Head short, thick, obtuse; anterior part of the body stout; body not elongate. Occipitals not broken up into smaller shields. Chin-shields small, separated by two or three series of small scales. Only one postocular (exceptionally two). Twenty-nine to thirty-three series of scales round the neck; 150-176 scales in a longitudinal series between the throat and the vent. No distinct ventral shields; four or six small præanal shields. Scales smooth in the young, and with a central tubercle in the adult. In fresh adult specimens which have not lost the epidermis, each scale of the eight ventral series is provided with a long central spine. Forty-one to forty-three broad blackish bands across the back, extending downwards to the middle of the sides, where they are narrower, rounded; they are separated by narrow interspaces of the ground-colour, and are sometimes more or less confluent along the vertebral line. The lower half of the side and the belly yellowish. Forehead with a whitish cross band before the eyes, which disappears with age; the young with a distinct yellowish temple-streak. Tail black, with from three to five yellowish bands across its basal half.

I have examined six examples of this species, one of which is the typical specimen; several circumstances lead me to suppose that it was procured at Pinang; it is 20 inches long, cleft of the mouth $\frac{2}{3}$ inch, tail $2\frac{1}{4}$ inches. Another specimen is 30 inches long.

HYDROPHIS LOREATA.

Lapemis loreatus, Gray, *Ann. & Mag. Nat. Hist.* 1843, xi. p. 46.

— *hardwickii*, var., Gray, *Viper. Snakes*, p. 44.

? *Hydrophis pelamoides*, var. *annulata*, Fischer, *Abhandl. Naturw. Hamb.* 1856, iii. p. 67.

Head short, thick, obtuse; anterior part of the body stout; body not elongate. Occipitals not broken up into smaller shields. Chin-shields small, separated by two or three series of small gular scales; only the anterior pair are sometimes slightly in contact with each other. Only one postocular. Twenty-seven to thirty-one series of scales round the neck; no distinct ventral shields, but the three or four lower lateral series are considerably larger than the others; there are 145-158* scales in the third lower series, between angle of the mouth and

* 145 in two specimens, 147 in a third, 155 in a fourth, 158 in a fifth.

vent; six small preanal shields. Scales with a central tubercle, which is elongate and more distinct on the ventral scales than on those on the back, where the tubercles are sometimes entirely obsolete. Twenty-nine to thirty-four (thirty-seven in a specimen from the Philippine Islands) black rings round the body; they are broadest on the back, tapering on the sides and belly; they are as broad as the interspaces of the yellowish ground-colour, which, however, are narrowest on the back. Head black, with a more or less distinct yellowish band across the frontals; a yellowish temple-streak becomes indistinct in old specimens. Tail black, with about six white bands across its upper and basal half. In old specimens the black rings become sometimes indistinct, the back being dull brownish olive, the belly yellowish.

The five examples which I have examined, and one of which is the typical specimen, are from Borneo and from the Philippine Islands. The typical specimen has a separate loreal shield on one side, which is accidental. The largest specimen is 3 feet long, the tail measuring $3\frac{1}{2}$ inches, the cleft of the mouth 1 inch.

ENHYDRINA, *Gray*.

Differing from *Hydrophis* only by having a deep longitudinal notch in front of the lower jaw.

Only one species is known.

ENHYDRINA BENGALENSIS.

- Valakadyen, *Russell, Ind. Serp.* i. tab. 11.
 Hydrus valakadyen, *Boie, Isis*, 1827, p. 554.
 Hydrophis schistosus (not Daud.), *Schleg. Phys. Serp.* ii. p. 500. pl. 18. figs. 1-3. *Fischer, Abhandl. Naturw. Hamb.* iii. p. 48. *Dum. & Bibr. Erpét. gén.* vii. p. 1344.
 Hydrus schistosus, *Cantor, Mal. Rept.* p. 132.
 Hydrophis bengalensis et H. subfasciata, *Gray, Zool. Misc.* p. 62.
 Enhydrina bengalensis et E. valakadyen, *Gray, Viper. Snakes*, p. 48.
 Thalassophis werneri, *Schmidt, Abhandl. Naturw. Hamb.* ii. p. 84. taf. 6 (bad).

Head rather short, of moderate width; neck and body moderately elongate. Rostral shield very small, lobuliform, its projecting point fitting into a corresponding cavity of the lower jaw; the fourth upper labial shield below the eye; mental shield very narrow and long, situated in a groove; anterior lower labials much elongate; throat covered with scales, without shields. One postocular, sometimes divided into two. Neck surrounded by forty-eight series of scales. Scales scarcely imbricate, hexagonal, each provided with a short keel; ventral shields not, or but little, different from the scales of the adjoining series; they are 284-314 in number. Terminal scale of the tail rather large. The young has broad

black rhombic bands across the back, which become fainter with age, and finally disappear entirely.

This species is rather common in the Bay of Bengal and in the western parts of the Archipelago, extending to the coast of New Guinea; it attains rarely to a length of 4 feet, a new-born individual measuring 10½ inches.

PELAMIS.

Pelamis, sp., *Daud.*

Head flat, with very long, spatulate snout; neck rather stout; body of moderate length. Nasal shields contiguous, longer than broad, pierced by the nostril posteriorly; only one pair of frontals. Scales not imbricate, not polished, tubercular or concave. Ventral shields none or very narrow. Lower jaw without notch in front.

PELAMIS BICOLOR.

Russell, i. p. 47. pl. 41.

Hydrus bicolor, *Schneid. Hist. Amph.* p. 242. *Cantor, Mal. Rept.* p. 135.

Pelamis bicolor, *Daud. Rept. vii.* p. 366. *Gray, Viper. Snakes*, p. 41. *Fischer, Abhandl. Naturw. Hamb.* 1856, p. 61.

Hydrophis variegata, *Schleg. Faun. Japon.* tab. 8.

— *pelamis*, *Schleg. Phys. Serp.* ii. p. 508. pl. 18. figs. 13-15.

Pelamis ornata, *Gray, Viper. Snakes*, p. 43.

Two or three postorbitals. Neck surrounded by from forty-five to fifty-one longitudinal series of scales. From 378 to 440 scales in a lateral longitudinal series between the angle of the mouth and the vent*. Coloration variable.

Var. *a*. The upper part of the head and the back are uniform black, the sides and belly uniform brownish olive; both colours are sharply defined, and sometimes separated by a yellow band. Tail with large black spots.

Var. *β*. The black of the back and the brown of the sides are separated by a yellow band, as in var. *a*, but there is another black lateral band, below the yellow one, broken up posteriorly into a series of large round black spots.

Var. *γ*. The black band of the back is rather narrow, becomes sinuous on or behind the middle of the length of the body, and is broken up posteriorly into a dorsal series of rhombic,

* Numerous examples have a small spiny tubercle, or a series of two or three tubercles, on each scale of the lower and lateral parts; other specimens do not show any trace of these tubercles, but a more or less distinct groove instead. I have never observed tubercular scales in young examples.

more or less confluent spots, extending downwards on the sides. Sides and belly with rather irregular series of rounded black or brown spots. This variety is intermediate between var. β and var. δ , and has been named *sinuata*.

Var. δ . Yellow, with about fifty brown, black-edged cross bands, extending nearly to the belly, which again is crossed by narrow vertical brownish-black streaks, alternating with the dorsal bands. Some of the dorsal bands are confluent, forming a zigzag band. Head yellow, variegated with black: *H. variegata*, Schleg.; *P. ornata*, Gray; *varietas alternans*, Fischer.

This species is one of the most common Sea-snakes, and has the widest geographical range of all the species of this family; it appears to be found throughout the tropical and sub-tropical parts of the Indian and Pacific Oceans. We have received specimens captured off the coast of Madagascar, in the sea between Australia and New Zealand, and the Sea-snakes seen off the coast of Panama appear to belong to this species. Fischer (*l. c.*) mentions specimens, preserved in the Berlin Museum, and marked "West Coast of Mexico," and the British Museum has received a specimen said to be from Panama. None of the specimens we have examined exceed a length of 3 feet.

Third Suborder.

OPHIDI VIPERIFORMES—VIPERINE SNAKES.

Snakes with a long, perforated, erectile fang on the maxillary, which is extremely short, without any other teeth.

They are divided into two families:—

- | | |
|--|--------------------|
| Loreal region with a pit between the eye and nostril | CROTALIDÆ, p. 383. |
| Loreal region flat, without pit | VIPERIDÆ, p. 395. |

FAMILY OF PIT-VIPERS—CROTALIDÆ.

Body robust; tail of moderate length or rather short, sometimes prehensile; head broad, subtriangular, frequently scaly above or imperfectly shielded; a deep pit on the side of the snout, between the eye and nostril; eye of moderate size, with vertical pupil. Viviparous.

The Pit-Vipers are found only in Asia and America; those of the New World surpassing the Asiatic species in size, and therefore they are much more dangerous. A rudiment of the curious caudal appendage of the American Rattlesnakes is found as a simple spine-like scale in some of the Asiatic species (*Halys*). Some live on bushes, others on the ground.

Synopsis of the Indian Genera.

Upper side of the head covered with small scales, only the foremost part of the snout being shielded	<i>Trimeresurus</i> , p. 384.
Upper side of the head with large shield-like scales. Scales very large	<i>Peltopeltor</i> , p. 390.
Head entirely shielded above; scales smooth	<i>Calloselasma</i> , p. 391.
Head entirely shielded above; scales keeled	<i>Halsys</i> , p. 392.
Snout covered with small irregular shields above, the shields of the remainder of the head being normal	<i>Hypnale</i> , p. 394.

TRIMERESURUS*.

Trimeresurus, sp., *Lacép. Ann. Mus.* 1804, iv. p. 196.

Head triangular, covered above with small scales, except the foremost part of the snout and the supraciliary region, which generally are shielded; body with more or less distinctly keeled scales, in from seventeen to twenty-seven series. Body and tail of moderate length, prehensile. Subcaudals two-rowed.

The *Trimeresures* are Tree-snakes, as is indicated by their prehensile tail and by their green or varied coloration. In general they are sluggish, not attempting to move out of the way, and as they very closely resemble the branch on which they rest, they are frequently not perceived until they prepare to dart, vibrating the tail and uttering a faint hissing sound, or until they have bitten the disturber of their rest. Accidents caused by these snakes, therefore, are not of uncommon occurrence, and it is a fortunate circumstance that comparatively but few examples attain to a size of more than 2 feet, so that the consequences of their bite are less to be dreaded than of other poisonous snakes. Indeed, numerous cases are on record which show that the symptoms indicating a general effect on the system were of short duration, extending only over the space of from two to forty-eight hours, and confined to vomiting, nausea, and fever. After the pain and swelling of the bitten member or spot have subsided, the vicinity round the wound becomes discoloured, mortifies, and is finally thrown off as a black, circular slough, after which health is speedily restored. The bite of larger specimens, from 2 to 3 feet long, is more dangerous, and has occasionally proved fatal: so that the greatest care should always be observed in the immediate treatment of the patient.

* We include in this genus not only the species of *Trimeresurus*, Gray, but also those of *Parias*, Gray, and of *Megara*, Wagl.; the two latter genera having the scales keeled, and not smooth, as has been stated by several herpetologists. The keels are faint in some specimens, and sometimes become almost invisible when the specimens have been badly preserved, or when the epidermis has been lost. The frontal shields, which are well developed in *T. trigonocephalus*, are present, but smaller, in the other species. A division of the supraorbital plate, which is constant in one species, is occasionally found in species which usually have it undivided. Osteological characters, like the greater or less width of the skull, do not appear to me to be of greater value than those external ones which I have mentioned.

When roused these snakes are extremely fierce, striking at everything within their reach, and Cantor says that in the extreme of fury they will fix the fangs in their own bodies. Frogs, mammals, and birds form their food, and I have never found a lizard or snake in their stomach.

The Trimeresures occur only in the East Indies, and belong to a tribe of snakes which is provided with a singular pit in the loreal region, and found in the New and Old World. We are not at present acquainted with the use of this organ. The following species are known:—

- * The second upper labial shield forms the front part of the facial pit; the last ventral shields entire; ventral shields less than 200.
 Grass-green. Scales in nineteen or twenty-one rows; one or two small shields between the supranasals *T. gramineus*, p. 385.
 Grass-green. Scales in twenty-one rows; supranasals in immediate contact with each other *T. erythrusus*, p. 386.
 Grass-green. Scales in twenty-three or twenty-five rows *T. carinatus*, p. 386.
 Upper parts dull reddish brown. Scales in twenty-five or twenty-seven rows *T. purpureus*, p. 387.
 A black or brown temporal band. Scales in twenty-one series *T. anamallensis*, p. 387.
 Ground-colour brown or black; a yellow temporal band. Scales in twenty-three series *T. monticola*, p. 388.
- ** The shield forming the front part of the facial pit is separate from the second upper labial; ventral shields less than 200.
 Scales in twenty-three or twenty-five rows *T. wagleri*, p. 388.
 Ground-colour brown. Scales in twenty-one rows *T. strigatus*, p. 389.
- *** The ventral shield before the anal is deeply notched or divided into two; ventral shields less than 200.
 Scales in seventeen or nineteen rows *T. trigonocephalus*, p. 390.
- **** Ventral shields more than 200.
 Brownish grey above with black rings *T. mucroquatus*, p. 390.

TRIMERESURUS GRAMINEUS.

- Russell, Ind. Serp.* i. pl. 9.
- Coluber gramineus, Shaw, Zool.* iii. p. 420.
- Vipera viridis, Daud. Rept.* vi. p. 112.
- *gramineus, Cantor, Mal. Rept.* p. 119.
- Trimeresurus viridis, Gray, Ann. & Mag. Nat. Hist.* 1842, xii. p. 391.
- *elegans, Gray, Ann. & Mag. Nat. Hist.* 1853, xii. p. 391 (young).

The second upper labial shield forms the front part of the facial pit. The supranasal is separated from its fellow by an azygos shield or by a pair of very small shields, situated behind the rostral. Scales in from nineteen to twenty-one rows; those on the crown of the head smooth or very indistinctly keeled. Ventrals 158-170; subcandals 58-71. Grass-green above, lighter on the sides; tail sometimes cinnamon-red; a yellow or brick-red line runs from behind the eye along the outer series of scales. Lower parts pale greenish.



We have received this species from Pinang, Mergui, the Lao Mountains (Cochinchina), Khasya, Sikkim, Ladak, and Ningpo (China). It attains to a length of 32 inches, but is generally smaller; it is rather common, hanging from branches of trees, or concealed under the dense foliage; it feeds on small birds and frogs.

We have not the means of ascertaining whether a snake common in the Andaman and Nicobar Islands, and mentioned by Blyth, first as *Trimeresurus cantori* (Journ. As. Soc. Beng. 1846, xv. p. 377), and afterwards as *Trimeresurus viridis*, var. *cantori* (l. c. 1861, xxix. p. 111), really belongs to this species or not. Probably it is distinct, but Blyth's notes do not contain characters sufficient to determine this point.

TRIMERESURUS ERYTHRURUS.

Russell, Ind. Serp. ii. pl. 20.

Trigonocephalus erythrurus, *Cantor, Proc. Zool. Soc.* 1839, p. 31.

Trimeresurus albolabris, *Gray, Zool. Misc.* p. 48.

Trigonocephalus viridis, *Schleg, Phys. Serp.* ii. p. 544. pl. 19. figs. 12 & 13.

The second upper labial shield forms the front part of the facial pit. Supranasals in immediate contact with each other behind the rostral shield. Scales in twenty-one series, those on the crown of the head slightly keeled. Ventrals 150-164; subcaudals 54-70. Grass-green above, lighter on the sides. The upper lip is whitish, sometimes with a pure white line running along the whole side of the head, below the eye; a whitish line along the outer series of scales. Lower parts greenish white. Old females do not show either the white lips or the lateral line.



The specimen described by Cantor (and still preserved in the Museum of the University of Oxford) was from the Delta of the Ganges; we have received it from Java, Siam, and China. An old female measures 33 inches, the tail being 6 inches.

TRIMERESURUS CARINATUS.

Trimeresurus carinatus, *Gray, Zool. Misc.* p. 48.

— *bicolor*, *Gray, Ann. & Mag. Nat. Hist.* 1842, xii. p. 392.

— *porphyraceus*, *Blyth, Journ. As. Soc. Beng.* 1861, xxix. p. 110.

Cryptelytropis carinatus, *Cope, Proc. Acad. Nat. Sc. Philad.* 1859, p. 340.

The second upper labial shield forms the front part of the facial pit. Scales in from twenty-three to twenty-five rows; those on the crown of the head and on the temples small, strongly carinated. Ventrals 164-169; subcaudals 54-60. Grass-green above, tail yellowish green; a more or less distinct yellowish line runs along the outer series of scales, and is sometimes absent. Lower parts greenish white.

We have received specimens of this species from Sikkim and Rangoon. An adult female is 37 inches long, the tail measuring 6 inches. According to Blyth it would be common in Lower Bengal.

TRIMERESURUS PURPUREUS.

Trimeresurus purpureus, Gray, *Zool. Misc.* p. 48.

Trigonocephalus purpureo-maculatus, Gray, *Ind. Zool.* c. fig.

— *puniceus*, Cantor, *Mal. Rept.* p. 122 (not synon.).

The second upper labial shield forms the front part of the facial pit. Supranasals separated from each other by one or two small shields situated behind the rostral. Supraciliary narrow, linear. Scales in twenty-five or twenty-seven rows, those on the crown of the head small, distinctly keeled. Ventrals 162–171; subcaudals 65–70. Dull reddish brown; lips, throat, the four outer series of scales, and lower parts pale greenish yellow; a yellowish band runs along the outer series of scales; ventral shields with the outer margins brown; subcaudals marbled with brown.

This species has hitherto been found only at Pinang and Singapore. The typical specimen, which I have compared with those collected by Cantor, is 38 inches long, the tail measuring 6 inches. Its tail is less prehensile than in the preceding species, and all the specimens observed by Cantor were found on the ground.

TRIMERESURUS ANAMALLENSIS. (Plate XXIV. fig. C.)

The second upper labial shield forms the front part of the facial pit; generally a small shield between the supranasals. Scales on the head and on the body more or less distinctly keeled, in twenty-one series. Ventrals 148–158; subcaudals 51–55. Ground-colour generally yellowish green, with a dorsal series of large rhombic black spots, each spot subdivided by, or variegated with yellow. Upper side of the head marbled with black in adult specimens, uniform greenish in young ones; a black or brown band runs from the back edge of the eye to the angle of the mouth; supraciliary with one or two black cross streaks. Belly yellowish green, with numerous yellow and black spots along its side. Tail black, with yellow and green spots. *Young* specimens may be recognized by the dark temple-streak; but nearly all the other markings are very indistinct, and the ground-colour is a reddish olive; tail with white extremity.

A specimen received with others from the same locality has a brownish-purple ground-colour, with a dorsal series of brown spots; belly marbled with purple; tail black, with irregular greenish rings and with some indistinct small yellowish spots. This specimen also has the supraciliary divided into two, but, nevertheless, we consider it merely as a variety.

We have received about a dozen specimens from the Anamallay Mountains through Captain R. H. Beddome; the largest is 24 inches long, the tail measuring 3½ inches.

I have for some time considered this species as possibly identical with *Trigonocephalus (Cophias) malabaricus*, n. s.?, Jerdon, *Journ. As. Soc. Beng.* 1854, xxii. p. 523, which is characterized thus:—"Very closely allied to *T. nigromarginatus*. Has twenty-one rows of smooth scales. Ventrals 145–149; subcaudals 48–53. Green above, with brown transverse and zigzag markings. Up to 2 feet long nearly. Not uncommon in all the forests of the west coast."

It is almost impossible to recognize a species from such a diagnosis. Moreover Mr. Jerdon describes

the scales as smooth, whilst they are keeled in our species, as in all the *Trimeresuri*. Mr. Elliot possesses a drawing of a young specimen, named *T. malabaricus*, Jerd. It resembles our species in coloration, but has a white, black-edged temple-streak instead of a black one. Mr. Jerdon does not mention either a black or a white temple-streak.

Quite indeterminate is another of Mr. Jerdon's species, for which he has proposed in his notes the name of *T. wardii*, l. c.

TRIMERESURUS MONTICOLA. (Plate XXIV. fig. B.)

*Parias** *maculata*, Gray, *Ann. & Mag. Nat. Hist.* 1853, xii. p. 392 (not *Trimeresurus maculatus*).

The second upper labial shield forms the front part of the facial pit; a pair of small shields behind the rostral. Scales on the head smooth, those of the body slightly but distinctly keeled, in twenty-three series. Ventrals 137-141; subcaudals 41. Male blackish ash, female and young pale brown; two series of square black spots along the back: the spots of the two series are either placed alternately with each other, or they are confluent into a single series of large quadrangular spots; sides with small, rounded black or brown spots; a white or yellow streak runs from the back edge of the eye to the side of the neck; the middle of the neck with a V-like yellow or whitish mark, more distinct in the male than in the female; belly densely marbled with brown.

We have received this species from Nepal and from Sikkim; an adult female is 21 inches long, the tail measuring $2\frac{1}{2}$ inches.

TRIMERESURUS WAGLERI.

Trigonocephalus wagleri, Schleg. *Phys. Serp.* ii. p. 542. pl. 19. figs. 16-18.

Trimeresurus maculatus, Gray, *Zool. Misc.* p. 48, and *Viper. Snakes*, p. 8.—[This *Tr. maculatus* is composed of young specimens of *Tr. wagleri*, Schleg., and of *Tr. formosus*, Gray; I consider the latter as a Bornean variety of *Tr. wagleri*, and different from the *Tr. formosus* of Müller and Schlegel.]

Trigonocephalus sumatranus, Cantor, *Mal. Rept.* p. 121. pl. 40. fig. 9 (not *Coluber sumatranus*, Raffles, a snake said to have 184 ventral shields).

Trimeresurus sumatranus, Gray, *Viper. Snakes*, p. 10.

— *subannulatus*, Gray, *Viper. Snakes*, p. 9. Motley & Dillwyn, *Nat. Hist. Labuan*, p. 44 c. tab. (var.).

— *formosus*, Gray, *Viper. Snakes*, p. 10 (not Müll. & Schleg.).

The shield forming the front part of the facial pit is separate from the second upper labial. The whole upper surface of the head covered with strongly keeled scales; supraciliary shield present. Scales in from twenty-three to twenty-five series. Ventrals 139-150; subcaudals 42-53. Coloration very variable according to age and locality: either green with whitish spots or transverse bands; or black with yellow spots. The *Malayan variety* shows the following coloration:—

Young: Grass-green above, lighter on the sides; a cinnamon-red line with the upper

* All the *Parias* of Gray have keeled scales.

margin buff runs from the pit through the eye, to behind the angle of the mouth; on each side of the back a series of distant spots or short transverse streaks, half cinnamon-, half buff-coloured. Lower parts uniform greenish yellow. This garb may be observed in specimens up to 16 inches in length. Specimens from Borneo, Sumatra, Celebes, the Philippine Islands, show this or a similar coloration long after they have attained to maturity*.

In *half-grown* specimens (about 22 inches long) all the scales are edged with blackish, having a yellowish-green centre. Distinct greenish-yellow bands, as broad as a scale, encircle the body; the head is varied with black and green above, both colours being equally distributed; a greenish-yellow streak, edged with black below, runs along the canthus rostralis and along each side of the crown of the head. Lower parts yellow, each ventral with a blackish margin.

Old specimens (3 feet long) are black, with about thirty-five bright-yellow cross bands, each as broad as a scale; numerous scales on the sides and a few on the back have a yellow ocellus, but a few of the scales on the upper side of the head are yellow; a yellow band from the eye towards the angle of the mouth; hinder part of the tail entirely black. The lips, the outer series of scales, and the ventrals bright yellow, each shield and scale edged with black.

This variety is common in the Malayan peninsula; other varieties occur in almost all the larger islands of the Archipelago. It exceeds a length of three feet, and feeds on small mammals, birds, and frogs.

TRIMERESURUS STRIGATUS. (Plate XXIV. fig. D.)

Trimeresurus strigatus, Gray, *Zool. Misc.* p. 48.

Trigonocephalus neelgherriensis, Jerdon, *Journ. As. Soc. Beng.* 1854, xxii. p. 524.

The shield forming the front part of the facial pit is separate from the second upper labial. Supraciliary shield narrow; no larger shields behind the rostral. The whole upper surface of the head is covered with small nearly smooth scales. Nine or ten upper labials, becoming smaller in size behind. Scales distinctly keeled, in twenty-one series. Ventrals 136-142; subcaudals 31-40. Tail but slightly prehensile, terminating in a short conical scale. Brown, with series of large irregular darker spots; a horseshoe-like or $\hat{\cap}$ -shaped white marking on the neck, sometimes rather indistinct. Lips yellowish; generally a triangular black spot below the eye and below the facial pit; an indistinct brown band from the eye to the side of the neck; lower jaw with black spots; belly marbled with black. Extremity of the tail white in young specimens.

This species is found in the Nilgherries and in the Dekkan. It does not attain to a considerable size, our largest specimen being 19 inches long, the tail measuring $2\frac{1}{2}$ inches.

* We have received a specimen from Dr. P. v. Bleeker's collection with the name of "*Tropidolemus schlegelii*."

TRIMERESURUS TRIGONOCEPHALUS.

Cophias trigonocephalus, *Merr. Tent.* p. 156.

— *nigro-marginatus*, *Kuhl, Beitr.* p. 20.

Trigonocephalus nigromarginatus, *Schleg. Phys. Serp.* ii. p. 541. pl. 19. figs. 14 & 15.

Megara trigonocephala, *Wagl. Syst. Amph.* p. 174. *Gray, Zool. Misc.* p. 49.

— *olivacea*, *Gray, Zool. Misc.* p. 49.

The second upper labial shield forms the front part of the facial pit; upper part of the snout with two pairs of shields in front, those of the middle pair square, twice as large as the outer ones. Supraciliary transversely divided into two. Scales in from seventeen to nineteen rows, those of the back slightly keeled, the others smooth. Ventrals 147–152; subcaudals 57–63. The anal shield is entire, but the ventral before it is deeply notched or divided into two. Green, with a network of black stripes on the head, one of which runs from the eye to the hinder end of the mandible; a black band along the middle of the back, emitting black streaks on each side, the streaks of both sides alternating with each other. The black has a narrow yellow border, and the transverse streaks generally enclose a rounded yellowish spot. Scales on the sides slightly tinged with yellow; ventral shields pale green, with a broad posterior yellow margin; subcaudals marbled with blackish, and end of the tail black.

A *variety* has no reticulated stripes on the upper surface of the head, the scales merely being edged with black; temporal streak very broad; the dorsal band commences in the middle of the length of the animal, and is interrupted.

This snake is peculiar to Ceylon, and not very common; it is a Tree-snake with a strongly prehensile tail, and attains to a length of 31 inches, the tail measuring 5 inches; in the stomach I have found tree-frogs and mice.

TRIMERESURUS MUCROSCQUAMATUS.

Trigonocephalus mucroscquamatus, *Cantor, Proc. Zool. Soc.* 1839, p. 32.

“Brownish grey above, with black, white-edged rings, covered with oval, half-keeled, pointed, imbricate scales; whitish beneath, dotted with black. Ventrals 218; subcaudals 91. Naga Hills, Assam.”

This species has not been recognized by later herpetologists, and I am unable to add further information, as unfortunately the typical specimen is lost. Only the drawing from it made by Cantor is preserved in the library of the Oxford Museum, and although it is evident that the species belongs to this genus, the lateral shields of the head are not distinct enough to admit of a description.

PELTOPELOR, *Gthr.*

A large pit in the loreal region. Head covered with large, shield-like, imbricate scales; body with twelve series of very large keeled scales. Body and tail of moderate length, prehensile. Subcaudals two-rowed.

Only one species is known.

PELTOPHELOR MACROLEPIS. (Plate XXIII. fig. C.)

Trimeresurus macrolepis, *Beddome, Madras Quart. Journ. Medic. Sc.* vol. v.

This most singular snake may be at once recognized by the very large scales with which the head and body are covered. Those on the head have somewhat the appearance of shields, being more or less truncated behind, imbricate; they are regularly arranged, and much in the manner of shields: there are a pair of anterior and a pair of posterior frontals, both of rather small size, and the latter separated from each other by one or two small scales; there is a large subhexagonal vertical and a large supraciliary. The occiput is covered by a large central and by two or three pairs of lateral occipitals. Rostral shield small, triangular, erect; nasal simple, pierced by the small round nostril; a narrow preocular above, and another below the facial pit; a crescent-shaped narrow shield forms the posterior and inferior margins of the orbit. Seven upper labials, the second of which forms the front part of the pit, the others of moderate size, the last being smaller than the middle ones; temporal scales 1+1. The scales are very large, much imbricate, keeled, quincuncially arranged, in twelve series; those in the outer series are the smallest. Ventrals 134-138; anal entire; subcaudals 53-56. Uniform green; dark olive-green in adults, bright grass-green in young ones; a yellow line along the outer series of scales; lower parts pale green.

This species was discovered by Captain Beddome in the Anamallay Mountains; the largest specimen is 21 inches long, the tail measuring $4\frac{1}{2}$ inches. It is a Tree-snake, closely allied to *Trimeresurus*.

CALLOSELASMA.

Calloselasma, *Cope, Proc. Acad. Nat. Sc. Philad.* 1859, p. 336.

Head triangular, pointed in front, covered with the normal number of shields above. Body of moderate length, with smooth scales, in twenty-one series. Tail of moderate length, not prehensile, terminating in a long spine-like scale. Subcaudals two-rowed.

Only one species is known.

CALLOSELASMA RHODOSTOMA.

Russell, Ind. Serp. ii. pl. 21.

Trigonocephalus rhodostoma, *Reinsw. Isis*, 1827, p. 561. *Schleg. Phys. Serp.* ii. p. 547. pl. 20. figs. 1-3, & *Abbild.* p. 59. pl. 19.

Snout triangular, pointed, broader than long. Frontals well developed, not broken up into smaller shields; the anterior frontals are small, triangular, longer than broad, pointed in front. Seven, sometimes eight, upper labials: the second is very small, not entering the

facial pit; the third and fourth are below the orbit, but excluded from it by an infraorbital Scales smooth, in twenty-one series. Ventrals 138-156; subcaudals 36-54; the tail terminates in a long curved spine. Reddish olive on the back, greyish olive on the sides, minutely dotted with brown; a series of large subtriangular brownish-black spots, each with a narrow black and white edge, runs along each side of the back; their truncated tops are directed upwards, and the interspaces between them equal their own width; a black line runs along the vertebral series of scales; a flesh-coloured band edged with black and white runs along the canthus rostralis, the superciliary, and the temple; lips reddish olive; a dark-brown band from the eye to the angle of the mouth. Lower parts whitish, finely marbled with brownish.

This species is found in Java, and the British Museum has received a specimen from Siam. It is one of the most beautiful and most dangerous venomous snakes. Feeding on frogs, it frequents grassy plains, and approaches gardens and human dwellings. Kuhl was eye-witness of a case where two men, bitten by one and the same snake, expired five minutes after. It attains to a length of 3 feet.

HALYS, Gray.

Head broad, obtuse in front, covered with the normal number of shields above. Body of moderate length, with keeled scales, in from twenty-three to twenty-seven series. Tail rather short, not prehensile, terminating in a long spine-like scale. Subcaudals two-rowed.

This genus is characteristic of the fauna of Central Asia, the species being found in Tartary, on the northern side of the Himalayas, in China, in Japan, and in Formosa. Three species are known, of which we describe two.

- The hinder labial shields are below a series of large temporal shields; anterior frontals divergent behind *H. blomhoffii*, p. 393.
 The hinder labial shields are below a series of large temporal shields; anterior frontals in a straight transverse line *H. pallasi*.*
 The hinder labials confluent with the temporals *H. himalayanus*, p. 395.

These three species have a very dark coloration; the Nilgherries, however, appear to be inhabited by a fourth, which is more brightly coloured. Not having seen it, we can only repeat the few words in which it has been characterized by Mr. Jerdon, the Indian ornithologist:—

TRIGONOCEPHALUS ELLIOTTI (*Jerdon, Journ. As. Soc. Beng. xxii. 1854, p. 523*).—Form massive; scales in twenty-three rows; ventral shields 151; subcaudals 43. Olive-green above; pearl-white beneath. Up to 2 feet and upwards long.

* *Trigonocephalus halys*, (*Everm.*) *Boie*; *Echidna aspis*, var. *pallasi*, *Merr.*—Tartary.

HALYS BLOMHOFII.

Trigonocephalus blomhoffii, Boie, *Isis*, 1826, p. 214. *Schleg. Phys. Serp.* ii. p. 552. pl. 20. figs. 8 & 9, and *Faun. Japon. Rept.* pl. 6. Gray, *Viper. Snakes*, p. 14.

— *affinis*, Gray, *Viper. Snakes*, p. 14.

Snout short, much broader than long, obtusely rounded in front. Frontals well developed, not broken up into smaller shields, but sometimes a smaller piece is detached from the larger shields. Anterior frontals short, transversely produced, and tapering on the sides; both taken together form a sort of crescent. Seven upper labials, gradually becoming lower behind; the three posterior are situated below a series of three large temporals; none of these temporals are in contact with the occipitals, the space between them being filled up with scales. Scales strongly keeled, in twenty-one series. Ventrals 136–150; anal entire; subcaudals 43–56. The tail terminates in a long spine. Brown, with a series of large, rounded darker spots along each side of the back, the spots of both sides sometimes confluent, sometimes very indistinct; a series of smaller, irregular brown or black spots along each side of the belly; belly marbled with brown or blackish. A blackish-brown band runs from the eye along the series of large temporal shields to the angle of the mouth; it is edged with yellow above and below. All these markings are much more distinct in males and young examples than in old ones; the former have a curved brown band between the hinder angles of the orbit.

This species is found in Japan, in the island of Formosa (specimens brought by Consul Swinhoe), and probably in China. A female from Formosa measures 29 inches, the tail being $4\frac{1}{4}$ inches.

HALYS HIMALAYANUS. (Plate XXIV. figs. A, A'.)

Trigonocephalus affinis, Günth. *Proc. Zool. Soc.* 1860, p. 167 (not Gray).

Snout of moderate length, broader than long, with the nose rather protruding. Rostral shield oblique, higher than broad; frontals well developed, not broken up into smaller shields. The anterior frontals short, transversely produced, and tapering on the sides; both taken together form a sort of crescent. Posterior frontals large, somewhat pointed in front, and rounded behind. Vertical and supraciliaries as usual in this genus; occipitals rather small, rounded. Five upper labials, a sixth and seventh being confluent with the temporals; the second is small, not entering the margin of the facial pit; the third enters the orbit. There is a series of three large temporal shields, the two hinder of which form a portion of the lip; the space between these temporals and the occipital is covered with small scales.

Body of moderate length, rounded; its middle is covered with twenty-three series of strongly keeled scales. Ventrals 162–166; anal entire; subcaudals 43–51. The tail terminates in a long spine. Dark brown, with large band-like spots across the back; these spots are very indistinct, scarcely differing from the ground-colour, and becoming visible only by their black edges; belly almost entirely black, marbled with yellowish. A broad blackish-brown band runs from the eye along the series of temporal shields to the angle of the mouth;

it has a narrow black and white edge above and below, and is better defined in the young individual than in the old one. Lower labials marbled with yellowish and blackish.

We have received this species from Garhval, Himalayas (altitude 9000 feet), through Dr. Cantor and Messrs. v. Schlagintweit. The larger of the two specimens is 25 inches long, the tail measuring $3\frac{3}{4}$ inches.

HYPNALE, Fitz.

Head broad, triangular; snout covered with numerous small shields above, the crown of the head being normally shielded. Body of moderate length, with keeled scales in seventeen rows. Tail rather short, not prehensile, terminating in a short conical scale. Subcaudals two-rowed.

Only one species is known.

HYPNALE NEPA. *The Carawala.*

Coluber nepa, Laur. Syn. p. 97.

Russell, Ind. Serp. ii. tab. 22.

Carawala, Davy, Ceylon, p. 85.

Cophias hypnale, Merr. Tent. p. 155.

Trigonocephalus hypnale, Wagl. Syst. Amph. p. 174. Schleg. Phys. Serp. ii. p. 550. pl. 20. figs. 6 & 7. Gray, Viper. Snakes, p. 15.

Trimesurus? ceylonensis, Gray, Zool. Misc. p. 48, and Viper. Snakes, p. 11.

Trigonocephalus zara, Gray, Viper. Snakes, p. 15.

Snout rather short, triangular, with a sharp canthus rostralis, and with the nose slightly turned upwards. Frontal shields broken up into numerous small ones, which are symmetrically arranged. Occipitals small, as large as supraciliaries, rounded behind. Seven upper labials, the posterior not much lower than those in the middle; a series of four temporal shields above the labials, none of them being in contact with the occipital. Scales slightly keeled, in seventeen series. Ventrals 140-152; subcaudals 31-45. The tail terminates in a short conical scale. Brown or grey or reddish olive, with a double dorsal series of brown or black spots; the spots of both sides sometimes confluent into cross bands. Sides and belly finely marbled and dotted with brown or black. Upper lip brown or black, well marked by a darker line running from behind the eye to the angle of the mouth; a more or less distinct white or whitish temporal streak above the dark line, sometimes continued along the side of the neck, with an interrupted brown band above and below it. Chin and throat blackish or brownish, variegated with yellow or grey. Sometimes specimens occur of a more uniform coloration: the dorsal spots, the dark temporal line, and a pair of whitish spots on each side of the throat are the most constant markings. Other specimens are flesh-coloured,

with small black markings as described. All these variations may be seen in fœtus taken out of the same female.

The "Carawala," or "Carawilla" as some write it, is not only found in Ceylon, but also in the peninsula of Southern India, specimens having been obtained in Malabar and in the Anamallay Mountains by Captain R. H. Beddome; they do not differ from those of Ceylon. Duméril mentions a specimen, in the Paris Museum, from the Philippine Islands; but this, of course, is as incorrect as the statement of *Uropeltidæ* occurring in those islands. The largest specimen I have seen is 19 inches long, the tail measuring $2\frac{1}{2}$ inches. It is, like the other snakes of this family, a viviparous species: in one female I have found five perfectly developed fœtus, 5 inches long; in another, seven eggs which did not show any development of the embryo. The Carawala is much dreaded, although its bite is but exceptionally fatal to man, and in such cases death does not occur before the lapse of some days. There is always every hope of restoring the patient by a timely application of the proper remedies.

FAMILY OF VIPERS—*VIPERIDÆ*.

Body robust; tail rather short, not prehensile; head broad or thick, generally scaly above, or incompletely shielded; no pit in the loreal region; eye of moderate size, with vertical pupil. Viviparous.

The Vipers inhabit the Old World and Australia, and are thoroughly terrestrial snakes. Africa produces the largest species and the greatest variety of forms. Only two are known from British India:—

Nostril very large	<i>Daboia</i> , p. 395.
Subcaudals simple	<i>Echis</i> , p. 396.

DABOIA, Gray.

Head covered with scales; nostril lateral, oblique, extremely large, in and between three nasal shields; a narrow supraciliary shield. Sides of the head covered with keeled scales, several series of which are between the orbit and the low upper labials. Scales much imbricate, strongly keeled, in twenty-nine or thirty-one series. Subcaudals two-rowed.

Only one species is known.

DABOIA RUSSELLII. *The Tic-polonga.*

Russell, Ind. Serp. i. p. 10, pl. 7; ii. p. 37, pl. 32.

The Tic-polonga, Davy, Ceylon, p. 85.

Coluber russellii, Shaw, Zool. iii. p. 418.

Vipera elegans, Daud. Rept. vi. p. 124. *Schleg. Phys. Serp.* ii. p. 588, pl. 21. figs. 4 & 5.

— *daboia, Daud. Rept.* vi. p. 119.

Daboia elegans, Gray, Zool. Misc. p. 69, and *Viper. Snakes*, p. 23.

— *pulchella, Gray, Zool. Misc.* p. 69.

— *russellii, Gray, Viper. Snakes*, p. 24.

Greyish brown, with three series of large black, white-edged rings, those of the middle series ovate, those of the outer circular; sometimes very small black, white-edged ocelli are scattered between the rings. A yellow line on each side of the upper surface of the head, the two lines convergent on the snout. Rostral and labial shields yellow with brown margins; a subtriangular brown, black-edged spot below the eye. Belly uniform yellowish or marbled with brownish; generally more or less numerous semicircular brown spots on the hinder margins of the ventral shields. Ventrals 163-170; subcaudals 45-60.

The Tic-polonga, as it is called in Ceylon, is a native of this island and of the peninsula of Southern India: we have received it from the Anamallay Mountains, from Waltair, Bombay, and Almorah (5500 feet elevation); it extends into the Himalayas, a specimen having been obtained in Kulu, at an elevation of 3400 feet. It attains to a length of 50 inches, the tail measuring 7 inches; it is thoroughly terrestrial, feeding chiefly on mice. It is one of the most common venomous snakes, and, on account of its size and nocturnal habits, more dangerous than the *Trimeresures* and *Hypnales*. A name usually applied to this species by the Europeans in the Peninsula is *Cobra monil.*

ECHIS.

Echis, sp., Merr.

Head covered with keeled scales: a pair of very small frontals behind the rostral shield. Nostril small, round, directed upwards, situated in a large nasal shield, which is subdivided behind the nostril. Sides of the head covered with keeled scales, two series of which are between the eye and the low upper labials. Scales much imbricate, strongly keeled, in from twenty-five to twenty-nine series, those in the lateral series have their tips directed obliquely downwards. Subcaudals one-rowed.

Only one species is found in India, which has been said to differ from its African congener (*E. arenicola*) in having an undivided linear supraciliary shield, whilst it is generally broken

up into a series of scales in the latter. I have observed numerous Indian examples in which the supraciliary region is scaly as in *E. arenicola*, and I have seen specimens of the latter with an entire supraciliary shield, so that this difference cannot be regarded as of specific value. Both, indeed, are extremely closely allied to each other, and the chief difference between them appears to be a somewhat increased number of ventral shields in the African form, viz. 167-180.

ECHIS CARINATA.

*Pseudoboa carinata**, *Schneid. Hist. Amph.* ii. p. 285.

Horatta Pam, *Russell, Ind. Serp.* i. pl. 2.

Echis carinata, *Merr. Tent.* p. 149.

Brown or brownish grey, with a series of subquadrangular or ovate whitish spots, edged with blackish brown; a subsemicircular whitish band on each side of each of the dorsal spots, enclosing a round dark-brown lateral spot. A pair of oblong brown, black-edged spots on the crown of the head, convergent anteriorly; a brown spot below, and an oblique broad streak behind the eye. Belly whitish, with more or less numerous round brown specks. Ventrals 149-154; subcaudals 21-26.

This little venomous snake is common in many parts of the peninsula of India—in the Anamallay Mountains, in the Carnatic, and in the vicinity of Madras; the largest specimen I have observed is 20 inches long, the tail measuring $2\frac{1}{2}$ inches. I have never found anything in its stomach but *Scolopendræ*. It is thoroughly terrestrial and viviparous. No case is known of its bite having proved fatal.

* Dr. Gray considers *Boa krait*, Williams, *Asiat. Res.* ii. p. 328, as a synonym of this species, but it is evidently a *Bungarus*.

Second Subclass. BATRACHIANS.

Only one ventricle of the heart; atrium incompletely divided into two. Passing a metamorphosis. Breathing by gills in an early stage of their development, the gills being permanent in some species. Two occipital condyles.

This Subclass comprises the Order of Tailless Batrachians (*BATRACHIA ECAUDATA* s. *SALIENTIA*), p. 398, that of Tailed Batrachians (*BATRACHIA CAUDATA* s. *GRADIENTIA*), p. 438, and that of Burrowing Batrachians (*BATRACHIA APODA*), p. 440.

THE ORDER OF TAILLESS BATRACHIANS—*BATRACHIA SALIENTIA*.

Body broad, short, in the perfectly developed state with four legs and without tail.

The Batrachians are distinguished from the other divisions of the vertebrate animals by their passing through a *metamorphosis*—that is, after their embryonal life, undergoing changes which affect not only their external form, but also their internal organs. The Tailless Batrachians, or the Frogs and Toads, have in their perfect condition a short, broad body, without a caudal appendage, and with four limbs, the posterior pair being much stronger and longer than the anterior, and specially suited for leaping or swimming or burrowing. Many species have an interdigital web, and the degree of its development between the hind toes in different species indicates their respective power of swimming. Such a membrane between the fore toes is found only in some of the climbing forms, which always have the extremities of the toes dilated into round disks. The food of the Batrachians consists of insects and worms, and only the largest kinds feed on small vertebrates also; they seize their prey with the clammy tongue, either flipping it out of the mouth, as those do which have their tongue adherent in front and free behind, or only turning it out when that organ is nearly entirely attached to the bottom of the mouth. Teeth are never found in the lower jaw, which is a simple, feeble arch, and only a few species have a pair of tooth-like prominences near the symphysis; on the other hand, the upper jaw and the vomer are very frequently armed with a series of feeble teeth, which in the largest species assist in seizing the food. The prey is swallowed entire.

Moisture is as necessary for Batrachians as food and air, hence they are found only in damp places or in the neighbourhood of water; and when the hot season commences, Batrachians living remote from water bury themselves deep enough in the ground to escape the exsic-

cating influence of a dry atmosphere, falling into a state of lethargy identical with the winter-sleep of the species inhabiting colder climates. Their lungs consist of two capacious sacs, which may be so much expanded that the animal assumes nearly twice its natural volume. When they dive the lungs are emptied, and the respiration remains interrupted for one or two hours, after which time the animal is compelled to rise to the surface in order to breathe. However, the necessity of breathing depends entirely on the energy of the other functions, as during hibernation or during the lethargy in the dry season the respiration is suspended for months*. Many Batrachians are endowed with a powerful voice, being provided with one or two membranaceous gular sacs. In the species which have two, one is situated at each side of the lower jaw, whilst in those having a single one it is placed between the branches of the mandible. In either case the vocal sac opens by two slits in the cavity of the mouth, and is filled with air from the lungs. These vocal sacs are peculiar to the male sex.

The skin is sometimes smooth, sometimes tubercular and glandular, the glands being either equally distributed over the whole surface of the animal, or aggregate. Such an aggregate gland is very frequently found above the tympanum, on each side of the neck, and having been compared with the parotid of the mammals, it has been termed *parotoid*†; it is merely a cuticular gland, and as it does not discharge its secretion into the cavity of the mouth, it has no reference whatever to the alimentary functions.

We have mentioned above that many Batrachians live at some distance from water; all, however, as far as is known at present, enter it at the season of propagation. The copulation is prolonged over several days, during which time the male holds the female tightly clasped with its fore legs. The males of many species may be externally distinguished by a rough swelling of their thumbs, or—as is the case in some American and Australian species—by short conical spurs on the thumb or in the sternal region. The males have also generally a distinctly more slender form than the females. The eggs are impregnated the moment they are deposited by the female in the water; during their passage through the oviduct they are surrounded with a gelatinous coat, which swells in the water and protects them from changes of temperature. The young ones, or Tadpoles, have a thick ovate body without legs, terminating in a long, strong, compressed tail, which serves as an organ of locomotion in the water. They are true aquatic animals, breathing by gills (which are enclosed in a cavity in the Tailless Batrachians), and having the same anatomical and physiological arrangement of the organs of circulation as fishes. The mouth is very narrow, and the jaws are armed with a hard, horny covering. Their food consists chiefly of living or decaying vegetables, but also of decomposing animal substances; and in accordance with this kind of food, so different from that taken by them after their metamorphosis, the intestinal canal is spirally contorted and much longer than in the perfect animal. In proportion as the gills are super-

* The suspension of the vital functions of the Batrachians, and their tenacity of life, has given rise to some fabulous tales. It has been proved that some of them will survive a lethargic state continued for years; but every attempt to revive the old stories of toads enclosed in coal-beds or rocks testifies to a lamentable ignorance of the merest elements of geology and physiology on the part of those who put forward such statements.

† I prefer this term to that of parotid, as the gland of the Batrachians is very different from the parotid of the higher classes of animals; it is compounded of *parotis* and *elbor*, and has unfortunately been misspelt parotoid in the 'Catalogue of the Batrachia Salientia.'

soded by the lungs, which are gradually developed, the hind limbs, and later the fore limbs, sprout forth, whilst the tail is absorbed; the intestinal tract becomes shorter, dividing itself into stomach and small and large intestine.

No inquiries have been made as to the time occupied by the Indian species in their development; it is about a hundred days in the European *Rana temporaria*. But several years elapse before the young perfect Batrachian attains its full size.

None are poisonous.

All the Indian species belong to the division which are distinguished by having the tongue adherent in front and more or less free behind (*Opisthoglossa*).

I. *Fingers and toes tapering or cylindrical, not dilated at the end*: Ground-frogs.

a. *Maxillary teeth present; the transverse processes of the sacral vertebra not dilated; no parotoids.*

- Toes entirely webbed; vomerine teeth none; tongue not notched behind . . . *Oxyglossus*, p. 401.
 Toes broadly webbed; vomerine teeth none; tongue deeply notched behind . . . *Dicroglossus*, p. 402.
 Vomerine teeth present; metatarsus with one or two blunt tubercles . . . *Rana*, p. 402.
 Vomerine teeth present; toes completely webbed; metatarsus with a flat, sharp-edged prominence . . . *Hoplobatrachus*, p. 410.
 Vomerine teeth present; toes incompletely webbed; metatarsus with a flat, sharp-edged prominence . . . *Ptychocephalus*, p. 411.

b. *Maxillary teeth present; the transverse processes of the sacral vertebra dilated; no parotoids.*

- Toes shortly webbed; eyelid prolonged into a triangular flap . . . *Megalophrys*, p. 412.
 Toes quite free; eyelid not prolonged . . . *Xenophrys*, p. 414.

c. *Maxillary teeth none; parotoids none.*

- Metatarsus with a pair of large, compressed prominences . . . *Cacopus*, p. 415.
 Metatarsus with two obtuse tubercles . . . *Diplompelma*, p. 417.

d. *Maxillary teeth none; parotoids present.*

- Toes webbed . . . *Bufo*, p. 418.

II. *Fingers or toes dilated into a disk*: Tree-frogs.

a. *Maxillary teeth present; the transverse processes of the sacral vertebra not dilated; no parotoids.*

- A glandular fold along each side of the back . . . *Hylorana*, p. 423.
 Vomerine teeth present; no glandular fold on the side of the back; fingers incompletely webbed . . . *Polypedates*, p. 427.
 Vomerine teeth none . . . *Ixalus*, p. 432.
 Fingers completely webbed . . . *Rhacophorus*, p. 435.

b. *Maxillary teeth present; the transverse processes of the sacral vertebra dilated; no parotoids.*

- Toes webbed . . . *Hyla*, p. 435.

c. *Maxillary teeth none; the transverse processes of the sacral vertebra dilated; no parotoids.*

- Toes webbed . . . *Kallala*, p. 436.

Note.—For completeness' sake we must mention a Batrachian which has been referred to the genus *Bombinator*, but the description of which does not contain those points by which its systematic position can be ascertained:—

BOMBINATOR SIKKIMENSIS, Blyth, *Journ. As. Soc. Beng.* 1854, xxiii. p. 300.—Size and general character (?) of the European *Bombinator igneus*, but the hind toes free, or slightly webbed only at their extreme base. Male with four large subquadrilateral papillose callosities on the breast, and corresponding callosities on the upper surface of the innermost digits of each fore foot. The tubercles of the head, body, and limbs

much more developed in males than in females. On the back are four irregular rows of large porous tubercles, and numerous minute tubercles without pores stud the rest of the upper parts. On the hind limbs small porous tubercles are very regularly disposed. Colour dull livid olive-green above, a little banded on the limbs; flame-coloured below, more or less marbled with dusky.

OXYGLOSSUS, *Tschudi*.

Fingers quite free; toes webbed to their tips by a very extensible membrane. Skin glandular or nearly smooth. Vomerine teeth none; tongue more or less elongate, not notched behind. Openings of the eustachian tubes small. Vocal sac single, internal.

Only two species are known, one (*O. larvis*) being confined to the Philippine Islands, whilst the other is found in the Archipelago as well as on the Continent.

OXYGLOSSUS LIMA.

Oxyglossus lima, *Tschudi*, *Batr.* p. 85. *Dum. & Bibr.* viii. p. 334.

Body and limbs stout; head small, with the snout rather short; canthus rostralis none; eye of moderate size, rather prominent; tympanum indistinct, as large as, or rather larger than, the eye. The inner nostrils and the openings of the eustachian tubes small. Tongue very long and pointed behind. Male with a single vocal sac, its lateral openings being small. Skin rough, with numerous small tubercles, and with series of larger warts on the sides and especially on the belly. Fingers rather long and pointed. Hind limbs stout, the distance between the vent and the metatarsal tubercle being a little less than the length of the body. Metatarsus with two tubercles; toes webbed to their tips by a very extensible membrane. Brown above, sometimes marbled with darker, sometimes with a paler dorsal streak. A deep-brown band along the hinder side of the thigh, and along the outer edge of the metatarsus and foot; a brown band from the chin along each side of the throat, and a brown L-shaped mark on each side of the hindmost part of the belly.

This species remains small, the largest specimen I have examined being only $1\frac{1}{4}$ inch long; its hind limb is not quite 2 inches in length. We have received it from the sea-coasts of Siam and Gamboja, from China and Java; it is said to occur also in Bengal.

DICROGLOSSUS, *Gthr.*

Fingers free ; toes broadly webbed ; tongue rather elongate, deeply notched behind ; vomerine teeth none ; openings of the eustachian tubes of moderate width, tympanum indistinct ; vocal sacs of the male external and lateral.

Only one species is known.

DICROGLOSSUS ADOLFI.

Dicroglossus adolfi, *Günth. Proc. Zool. Soc.* 1860, p. 158. pl. 28. fig. B.

Skin smooth or warty ; toes webbed to their tips by a very extensible membrane ; a cylindrical tubercle at the metatarsus, very much like the rudiment of a sixth toe. Above greenish or greenish brown, uniform or spotted with darker ; belly with dark specks.

In habit and size somewhat similar to *Bombinator igneus*, but with the snout more pointed. The skin is in some specimens warty, in others smooth. The tympanum is rather indistinct, and not quite the size of the eye. The inner nostrils are small and rather distant from each other, the openings of the eustachian tubes larger. The limbs are of moderate length ; the fingers quite free : the third is the longest ; the first is very little longer than the second and fourth, which are equal in length. The fourth toe is one-fourth longer than the fifth. The species varies considerably in coloration, and the most constant characters appear to be brownish specks on all or some of the lower parts, and a brownish streak on the hinder side of the thigh.

Length of the head and body 1 inch 7 lines ; of the fore leg 10 lines ; of the hind leg 2 inches 4 lines.

This species was discovered by Messrs. von Schlagintweit at Kalu and Simla, at elevations of from 2400 to 4200 feet above the level of the sea.

RANA, *auct.*

Fingers quite free, none of them opposed to the others ; toes webbed ; head covered with skin. Vomerine teeth in two series or groups ; tongue large, oblong, free and deeply notched behind. Metatarsus with one or two blunt tubercles.

True frogs are found in almost every part of the globe, except in Australia and in the islands of the Pacific. Some of the species attain a very large size, feeding on other smaller

frogs, young birds, &c. All the species are endowed with voice, which in the larger kinds is so loud that they have obtained the denomination of Bull-frogs. The hind limbs are well developed, and all have the toes webbed; the web is extremely broad in some species, reaching to the tips of the toes, and these frogs are enabled to jump along the surface of the water as over the firm ground. All are eatable, and many species are brought to market in great quantities.

The Indian species are not numerous, but most of them are very rich in individuals; they may be distinguished as follows:—

- * *The interdigital membrane reaches to the tip of the toes and is very broad, scarcely emarginate.*
 - Lower jaw generally with a pair of fang-like prominences; a light cross band between the eyes *R. kuhlii*, p. 404.
 - Lower jaw without fangs; the distance between vent and knee is less than one-half of the length of the body *R. hexadactyla*, p. 405.
 - Lower jaw without fangs; the distance between vent and knee is one-half of the length of the body *R. cyanophlyctis*, p. 406.
- ** *The interdigital membrane is broad, but emarginate, and does not extend to the extremity of the fourth toe.*
 - Tympanum distinct; vomerine teeth in two oblique series; back with numerous short longitudinal folds *R. tigrina*, p. 407.
 - Tympanum hidden; a tubercular fold along each side of the back *R. liebigii*, p. 407.
 - Tympanum distinct; vomerine teeth in two short transverse series; a glandular fold along each side of the back *R. esculenta*, p. 408.
- *** *Toes only half-webbed.*
 - Metatarsus with one tubercle; an oblique brown band from the eye over the tympanum *R. silvatica*, p. 409.
 - Metatarsus with two tubercles; a dark triangular spot between the eyes *R. gracilis*, p. 409.

Several other Indian *Rana* have been described, but in so obscure a way that they cannot be distinguished by the characters assigned to them, and it is very doubtful whether they will prove to be really distinct:—

Mr. Jerdon (Journ. As. Soc. Beng. 1854, p. 531) mentions a *Rana crassa*, *R. flavescens*, *R. agricola*, *R. nilagirica*, all from the peninsula of India: it is impossible to recognise these frogs from Mr. Jerdon's notes.

Mr. Blyth (Journ. As. Soc. Beng. 1855, xxiv. pp. 719 & 720) mentions two frogs from Pegu, which he denominates *Rana fusca* and *Rana altilabris*. Another "common Calcutta species" is named *Rana assimilis* by the same gentleman (in Kelaart, Prodr. Faun. Zeyl. Append. p. 48), but afterwards referred to *R. vittigera*, Wieg. (Journ. As. Soc. Beng. xxiii. p. 731).

Hallowell (Proc. Acad. Nat. Sc. Philad. 1860, p. 504) describes three species of *Rana* from Hongkong, viz. *R. trivittata*, *R. nebulosa*, and *R. multistriata*; they also are so badly characterized that we cannot decide whether they are really distinct from those known to us. The first is, perhaps, identical with *R. esculenta*.

Dr. Kelaart (Prodr. Faun. Zeyl. i. p. 192) characterizes a Ceylonese frog, which he names *Rana newera-ellia*, as follows:—"Dark brown, nearly black; indistinctly spotted at times. A pale medial line on the back. Beneath pale brown or yellowish. About $\frac{3}{4}$ inches long."

RANA KUHLLI. (Plate XXVI. figs. A & B.)

Rana kuhlii (Schleg.), *Dum. & Bibr. Erpét. gén.* p. 384. *Günth. Batrach. Sal.* p. 8.
 — *corrugata*, Peters, *Monatsber. Berl. Acad.* 1863, p. 412.

Snout short, rounded, without canthus rostralis; eyes very prominent, directed obliquely upwards and forwards; tympanum hidden. Lower jaw generally with a pair of very prominent, fang-like apophyses in front; vomerine teeth in two rather indistinct, short, oblique series, convergent behind. Skin on the back with short longitudinal or transverse plaits, which become indistinct with age, and with small tubercles. Hind limbs thick and short, the distance between vent and metatarsal tubercle being equal to, or somewhat more than, the length of the body. Tips of the toes slightly swollen, fingers tapering; toes completely webbed; a narrow fringe along the inner metatarsal edge, including a single elongate tubercle. Brown above, marbled with darker; a reddish, black-edged transverse band between the eyes. Lower parts whitish, throat and inner side of the hind limbs marbled with brown.

This frog is not uncommon in Ceylon, and is found in Java, Celebes, and at Ningpo in China. The usual size of the specimens in European collections is not much more than 2 inches, but I have examined a specimen the body of which is $4\frac{1}{2}$ inches long, the hind limb measuring 6 inches. In none out of eight specimens have I been enabled to find a gular sac or sublingual openings. The specimens figured on Plate XXVI. are from Ningpo.

Professor Peters (*l. c.*) has proposed the name of *Rana corrugata* for specimens received from Ceylon, stating that I had "confounded" this new species with *Rana kuhlii*. I may be permitted to say that, although aware of differences existing between specimens from Ceylon and the East Indian Archipelago, I considered the Ceylonese examples only as a variety of *Rana kuhlii*, which I designated as variety B, characterising it by the transverse plaits of the skin of the back.

Professor Peters says that his new species is distinguished by a shorter snout, by a narrower interspace between the choanae, by shorter limbs, by perfectly pointed fingers, and by the transversely plaited skin of the back—characters which may also be seen in those of our specimens which are of the same size as those of the Berlin Museum, viz. of a length of from 40 to 60 millim.

The most important of these characters appeared to me to be the transverse folds of the skin, but this is evidently not constant. We possess two examples from Ningpo, one 52 millim. and the other 100 millim. long, both having been collected by the same person at the same place. Whilst the smaller specimen agrees in every respect with the Ceylonese form (*R. corrugata*), the larger one has lost every trace of the corrugated folds, and, instead of them, small conical warts are scattered over the back. These tubercles have a wide pore at the tip, or a small horny spine, and are flat, but already visible in younger examples. This proves that the transverse corrugated folds are at least as inconstant a character as the mandibular fangs.

As regards the length of the snout and the width of the space between the choanae and vomerine teeth, we must recollect that individuals with shorter and longer snout occur in numerous other species—*R. temporaria*, *R. tigrina*, &c.; but I will not deny that if such a difference is observed in individuals from different localities, it becomes a character worthy of notice, and certainly might be used for specific distinction, if joined with a second.

All our specimens have the fingers *equally* pointed, except the large one, in which the extremities of the fingers are slightly rounded off; and I cannot find such a difference in the length of the limbs as has

been observed by Professor Peters. I give the measurements, in millimetres, of five of our specimens for comparison with those found by him:—

	British Museum.					Berlin Museum.	
	Ceylon.	Ningpo.	Ningpo.	Java.	Celebes.	R. corrugata.	R. kuhlii.
Total length*	53	100	52	47	50	46	60
Width of the space between the choanae	4	10	4	5	5		
Length of the fore leg	29	60	31	38	30	26	35
Length of the hind leg†	75	153	75	79	77	59	85

It will be seen from these measurements that the differences in the length of the limbs of Ceylonese and Chinese specimens on the one hand, and of Javan on the other, are not constantly so great as has been shown by Peters. I have selected a specimen from Java, sent from the Leyden Museum as *Rana kuhlii*.

Under these circumstances I should consider it as an error of omission to "confound" the two forms, but think it better still to distinguish them as varieties, as I have done formerly, than to adopt a species founded on doubtful characters.

RANA HEXADACTYLA.

Rana hexadactyla, Lesson, in *Bélang. Voy. Ind. Orient. Rept.* p. 331.

Dactylethra bengalensis, Less. *Ill. Zool.* pl. 47.

Rana cutipora, Dum. & Bibr. *Erpét. gén.* viii. p. 339.

— *robusta*, Blyth, *Journ. As. Soc. Beng.* 1854, xxiii. p. 298.

Snout triangular, depressed, somewhat pointed in front, without canthus rostralis; tympanum rather indistinct, about as large as the eye. Lower jaw with two distinct, but scarcely prominent apophyses in front; the vomerine teeth are small, and form two oblique series, commencing from the inner anterior angle of the choanae, and converging behind. A transverse fold of the skin unites the posterior angles of the orbits. Skin of the back nearly smooth; of the throat, belly, sides, and hind part of the thighs tubercular, some of the tubercles being more prominent sometimes than the others, and forming continuous series. Hind limbs short and thick, with very wide skin; the distance between vent and knee is less than one-half of the length of the body. Fingers pointed; tips of the toes very slightly swollen; toes entirely webbed, the web reaching to the tips of the toes; a cutaneous fringe along the outer margins of the first and fifth toes; no fold along the metatarsus. The fourth toe is not much longer than the third and fifth; metatarsus with a single small tubercle.

Adult specimens preserved in spirits are uniform chocolate-brown above, with or without white vertebral streak; the lower parts uniform white, the hinder side of the thighs brown

* This is taken from the tip of the nose to the vent.

† This length is taken from the vent to the extremity of the longest toe, whilst Peters probably measured from the hip-joint.

with pure-white tubercles; web marbled with brown. A half-grown specimen (body $2\frac{1}{2}$ inches long) has a broad dark-brown longitudinal band on each side of the vertebral streak, and another irregular brown stripe along the side of the trunk; the hinder and lower sides of its thighs are densely marbled with brown, with two white bands running from the ham of one limb to that of the other. The ground-colour of living specimens is green.

The tongue is deeply notched behind. The thumb of the male is not thicker than that of the female. The vocal sacs are small, entirely separate, situated in a slit below the angle of the mouth; their internal openings are very small, scarcely as wide as the external nostrils.

We have received this fine species only from Ceylon and Madras; it is much scarcer than *R. tigrina*, and attains to a length of $5\frac{1}{2}$ inches, the hind limb being 8 inches (measured from the vent).

RANA CYANOPHLYCTIS.

Rana cyanophlyctis, *Schneid. Hist. Amph.* i. p. 137. *Peters, Sitzgeber. Berl. Acad.* 1863, p. 78.

— *bengalensis*, *Gray, Ind. Zool. Kelaart, Prodr. Faun. Zeyl.* i. p. 192.

— *leschenaultii*, *Dum. & Bibr. Expdt. gén.* viii. p. 342. *Cantor, Mal. Rept.* p. 138.

Snout of moderate length, but little pointed, without canthus rostralis; tympanum rather indistinct, as large as the eye. Lower jaw with two distinct, but scarcely prominent apophyses in front; the vomerine teeth are small, and form two short oblique series commencing from the inner anterior angle of the choanae, and converging behind. No fold of the skin across the occiput. Skin of the back finely tubercular, or nearly smooth. Hind limbs of moderate length, the distance between vent and knee being one-half of the length of the body. Fingers pointed; tips of the toes very slightly swollen; toes entirely webbed, the web reaching to the tips of the toes; a cutaneous fringe along the outer margins of the first and fifth toes; a very indistinct fold along the metatarsus. The fourth toe is not much longer than the third and fifth. Metatarsus with a single pointed tubercle. Tongue deeply notched. Thumb of the male somewhat swollen. The vocal sacs are large, externally separate, but communicating with each other interiorly; they are situated in a long slit at the lower margin of the mandible; their internal openings are of moderate size.

Upper parts blackish- or brownish-olive, with irregular brown spots; never a white vertebral streak. Lower parts uniform white or spotted with brown; a white band runs constantly along the hinder side of the thighs from one ham to the other.

This species is closely allied to *R. hexadactyla*, but remains much smaller, specimens from $1\frac{1}{3}$ to 2 inches long being fully mature; the largest example I have examined is $2\frac{1}{2}$ inches long, the hind limb measuring $3\frac{1}{3}$ inches. It differs constantly from *R. hexadactyla* in having a longer thigh. It is common in Ceylon (whence we have received numerous examples) and in Southern India, but is less numerous in the Malayan peninsula; it occurs also in Lower Bengal.

RANA TIGRINA.

- Rana tigrina*, Daud. *Rain.* p. 64. pl. 20. *Dum. & Bibr. Erpét. gén.* viii. p. 375. *Kelaart, Prodr. Faun. Zeyl.* i. p. 192. *Günth. Batrach. Sal.* p. 9. *Peters, Sitzgsber. Berl. Acad.* 1863, p. 77.
 — *cancrivora* (Boie), *Gravenh. Delic.* p. 41.
 — *brama*, Less., in *Bélang. Voy. Ind. Orient. Rept.* p. 329. pl. 6.
 — *vittigera*, *Wieg. Nov. Act. Acad. Leopold.-Carol.* 1835, xvii. p. 255. tab. 21. fig. 1.
 — *rugulosa*, *Wieg. l. c.* p. 258. fig. 2.

Snout of moderate length, rather pointed, without canthus rostralis; tympanum of moderate size, about as large as the eye. Lower jaw with two distinct, but scarcely prominent apophyses in front; the vomerine teeth are well developed and form two oblique series, commencing from the inner anterior angle of the choanae and converging behind. Skin on the back with numerous short longitudinal folds. Hind limbs rather thick and short, the distance between vent and metatarsal tubercle being equal to, or rather more than, that of the body. Tips of the fingers and toes very slightly swollen; the fourth toe is one-third longer than the fifth; toes completely webbed, the web extending not quite to the extremity of the fourth toe; a cutaneous fringe along the outer edge of the fifth toe; metatarsus with a single subrescent tubercle and with a slight fold of the skin along its inner edge.

The upper parts are brown, with large rounded blackish spots, which are sometimes confluent into transverse bands; lips whitish, with black spots; very frequently a white vertebral streak runs from the nose to the vent. Upper part of the hind limbs with broad blackish cross bands; lower parts whitish.

This species, the "Bull-frog" of Europeans, is very common over almost the whole of India. We have received it from Ceylon, Southern India, Sikkim, Bengal, the Malayan Peninsula, and China, besides different islands of the Archipelago. The specimens vary somewhat in size, in the more or less pointed form of the snout, in the length of the hind limbs, and in coloration. Bengal specimens do not attain to the same large size as those from Southern India, and generally have the white vertebral streak, or traces of it. Specimens from Ceylon are somewhat less stout in form, and their hind limbs are a little longer. But all these differences can hardly be considered as of specific importance. Although the Bull-frogs attain to a very large size, the body alone measuring from 6 to 7 inches in length, the young (after having passed the tadpole state) are, comparatively, very small—only one inch long. These frogs are exceedingly numerous, and when frightened jump over the surface of the water much in the same way as they do on land.

RANA LIEBIGII.

Rana liebigii, Günth. *Proc. Zool. Soc.* 1860, p. 157. pl. 28. fig. A.

Tympanum hidden; a strong tubercular fold from the eye to the axil, another along each side of the back; sacral region tubercular. Head broad; muzzle obtuse, with the canthus rostralis flattened. A slight groove across the occiput, uniting both the posterior angles of the eyelids. Vomerine teeth in two oblique series, convergent posteriorly. The fifth toe

not quite one-third the length of the third and fourth. Metatarsus with one tubercle; tips of the fingers and toes truncated.

The upper surface of the head is flat, with indistinct canthus rostralis; the loreal region is oblique, the snout short and broad, the distance between the angles of the mouth being very much more than the length of the head. The nostril is situated midway between the eye and the end of the snout. The eye is of moderate size, with a slight groove behind the orbit. The space between the eyes is as wide as an upper eyelid. The inner nostrils are a rather narrow transverse cleft, and in size about equal to the openings of the eustachian tubes. The lower jaw without prominences. Two tubercular folds arise from the eye, the stronger one running above the tympanum to the axil, the other along the side of the back towards the loin; the back and the belly are smooth; the sacral region, the sides of the body, and the upper parts of the thighs are more or less covered with broad tubercles. The toes and fingers are truncated or ending in small knobs. The former are webbed to their extremities, the membrane being slightly emarginate. The fourth toe is one-fourth longer than the third, which is rather longer than the fifth. One metatarsal tubercle. Brown: a dark streak along the canthus rostralis; the hinder side of the thighs with white spots; the lower parts brown, or whitish marbled with brown.

One specimen was found by Messrs. von Schlagintweit in Sikkim; another, from Nepal, was sent by B. H. Hodgson, Esq. Length of the body $3\frac{3}{4}$ inches, of the hind leg 6 inches.

RANA ESCULENTA.

Rana esculenta, L. *Syst. Nat.* i. p. 357. *Schleg. Faun. Japon. Rept.* p. 109. pl. 3. fig. 1.

— *cachinnans*, (Pallas) *Eichwald, Faun. Casp. Caucas.* p. 126. pl. 30.

— *marmorata*, *Hallowell, Proc. Acad. Nat. Sc. Philad.* 1860, p. 500.

? *Rana nigromaculata*, *Hallowell, l. c.*

Snout triangular, depressed, rather pointed, with the canthus rostralis very obtuse. Tympanum distinct, as large as the eye. The vomerine teeth form two short transverse rows between the inner nostrils. Back with a glandular fold on each side running from the eye to the loin; short glandular folds on the middle of the back. Hind limbs of moderate length, the distance between vent and knee being one-half of the length of the body. Tips of the fingers and toes very slightly swollen; the latter broadly webbed, but the web does not extend to the extremity of the toes; a cutaneous fringe along the outer margin of the fifth toe; metatarsus without lateral fold, but with two tubercles, the inner of which is oblong and compressed, the outer very small and scarcely distinct. The fifth toe is a little longer than the third, and the fourth much longer than either. Thumb of the male somewhat swollen. Vocal sacs of moderate size, one below each angle of the mouth; their internal openings are of moderate size.

The ground-colour of the upper parts varies from brown to green and blue; the glandular fold on the side of the back being of a lighter colour and sometimes white. Generally a light or white vertebral streak. Back and limbs spotted and barred with dark spots, seldom uniform. A brown or black band along the canthus rostralis, continued behind the eye and bent downwards behind the tympanum. No brown transverse spot between the eyes.

The usual length of this species is 3 inches, the hind limb measuring 5 inches. It is one of the most widely spread species, being found in every part of Europe, in North Africa, through Central Asia, to China and Japan. We have specimens from Ningpo and from the Chinese island of Chusan.

RANA SILVATICA.

Rana temporaria, Schleg. *Faun. Japon. Rept.* p. 109. pl. 3. fig. 2.

— *sylvatica*, Leconte, *Ann. Lyc. Nat. Hist. New York*, i. p. 282.

— *temporaria*, var. *japonica*, Günth. *Batrach. Sal.* p. 17.

Snout of moderate length, pointed, with the canthus rostralis very obtuse; tympanum somewhat indistinct, rather smaller than the eye. Vomerine teeth in two slightly oblique series between the choanae. Skin smooth; a glandular fold on each side of the back, running from the eye to the loin. Hind limbs rather slender, the distance from the vent to the heel being equal to the length of the body. Tips of the fingers and toes very slightly swollen, the latter being only half-webbed. The fifth toe without cutaneous fringe, and the metatarsus without fold. One metatarsal tubercle. The third and fifth toes equal in length, but much shorter than the fourth.

Brownish or brownish olive; a brown streak runs along the canthus rostralis, and an oblique brown band descends from the eye over the tympanum; sometimes a brown indistinct band between the eyes.

This species occurs in Japan, and in the neighbourhood of Ningpo, whence we have received a single example. It is most closely allied to our *Rana temporaria*, but the latter appears constantly to differ in having shorter hind limbs, the length of the body being considerably more than the distance of the vent from the keel. The North American *Rana sileatica* is still more closely allied to the Asiatic form, scarcely differing from it in having a somewhat shorter snout.

RANA GRACILIS.

Rana gracilis, Wieg. *Nov. Act. Acad. Leopold.-Carol.* 1835, xvii. p. 257. *Peters, Monatsber. Berl. Acad.* 1863, p. 78.

— *vittigera*, Günth. *Batrach. Sal.* p. 9 (not Wieg.).

Snout of moderate length, scarcely pointed, without canthus rostralis; tympanum of moderate size, smaller than the eye; apophyses of the lower jaw hardly conspicuous. The vomerine teeth form two oblique series, commencing from the inner anterior angle of the choanae and converging behind. Skin on the back with numerous short longitudinal folds. Hind limbs rather thick and short, the distance between vent and metatarsal tubercle being equal to, or rather more than, that of the body. Tips of the fingers and toes very slightly swollen; the fourth toe is one-third longer than the fifth; toes only half-webbed; a slight cutaneous fringe along the outer edge of the fifth toe; metatarsus with two tubercles and without outer fold. The vocal sac is rather small, internal, and provided with two lateral openings.

Greyish olive, with large dark spots and bars on the back and limbs; a triangular transverse spot between the eyes, with the point directed backwards, is always present. A white vertebral line is rarely wanting. Five broad short bands radiate from the orbit, forming two spots below the eye; the hinder band passes the tympanum. Uniform white below.

This is a small species, only $1\frac{1}{2}$ inch long, the hind limb measuring $2\frac{1}{4}$ inches. It is common near Ningpo and Hongkong, and is also found in Loochoo. We have received specimens from the Himalayas (Jámu), from Siam, and from Madras; the latter have the hind limbs comparatively a little longer.

HOPLOBATRACHUS.

Hoplobatrachus, Peters, Monatsber. Berl. Acad. 1863, p. 449.

Fingers quite free; toes completely webbed. Vomerine teeth in two oblique series; tongue deeply notched behind. Openings of the eustachian tubes small. Metatarsus with a flat, sharp-edged prominence.

This genus has been established for a single species from Ceylon, which I have never seen.

HOPLOBATRACHUS CEYLANICUS.

Hoplobatrachus ceylanicus, Peters, l. c.

In habit similar to *Rana esculenta*. Head as long as broad; snout rounded, one-fourth longer than the diameter of the eye; canthus rostralis obtuse; loreal region very high, concave along its middle. Tympanum rather indistinct, half as large as the eye. Cleft of the mouth comparatively narrow, the inner angle of the mouth being before the hind margin of the orbit, although the outer is situated below the middle of the tympanum. Choanæ very large; the vomerine teeth form two oblique series, convergent behind; they are placed on two bony ridges commencing from the anterior inner angle of the choanæ. Male with a vocal sac, opening by a pair of slits, which are situated a little before the inner angle of the mouth. Skin of the back with longitudinal folds and tubercles; a transverse fold from the hind part of one orbit to the other; another fold descends from the orbit above the tympanum to the upper arm. Hind limb considerably longer than the body; toes webbed to the tips, the interdigital membranes being rather deeply emarginate. A fold of the skin runs along the inner side of the tarsus and extends to the base of the metatarsal tubercle; there is no second tubercle, but a membranaceous fringe runs along the outer side of the fifth toe.

Dark green above, with blackish markings: viz., five cross bars on each upper lip, corresponding ones on the lower, and a spot at the angle of the mouth; a black streak along the

supratympanal fold; a cross band between the eyes, and five rather irregular transverse bands on the body; large spots on the sides, and cross bands on the limbs. A yellowish vertebral line from the snout to the vent.

Trincomalee. Length of body $3\frac{1}{2}$ inches, of the hind limb $5\frac{1}{2}$ inches.

PYXICEPHALUS.

Pyxicephalus, sp., *Tschudi*.

Tomopterna (*Bidr.*) et *Sphærotheca*, *Günth. Batrach. Sal.* pp. 7 & 20.

Fingers quite free; toes incompletely webbed. Vomerine teeth in two oblique series; tongue large, free and deeply notched behind. Openings of the eustachian tubes small. Metatarsus with a flat, sharp-edged, shovel-like prominence.

The species of this genus belong to the South-African and Indian faunas; those of the latter may be distinguished thus:—

Skin of the back nearly smooth *P. breviceps*.

Skin of the back coarsely tubercular *P. rufescens*.

PYXICEPHALUS BREVICEPS.

Rana breviceps, *Schneid. Hist. Amph.* i. p. 142. *Peters, Monatsber. Berl. Acad.* 1863, p. 76.

Pyxicephalus fodiens, *Jerdon, Journ. As. Soc. Beng.* 1854, p. 534.

— *pluvialis*, *Jerdon, l. c.*

Sphærotheca strigata, *Günth. Batrach. Sal.* p. 20, pl. 2. fig. A.

Tomopterna strigata, *Günth. Proc. Zool. Soc.* 1860, p. 165.

Body rather short and thick; head thick, rounded, with short rounded muzzle and much-swollen occiput; limbs short; fingers quite free, each with one or two very prominent tubercles at the palmar surface; metacarpus with a larger, oval, outer tubercle and with a smaller inner one; toes five, of moderate length, half-webbed, with indistinct tubercles; first cuneiform bone with a flat, oval, sharp-edged spur. Skin smooth, with some small indistinct tubercles; head above covered with moveable smooth skin. Nostril near the muzzle, very near the canthus rostralis; cleft of the mouth moderate; tongue cordiform, free and deeply notched behind; in the males on each side of the tongue a cleft for the vocal sac; vocal sac external, formed by two lateral bladders communicating in the middle. Inner nares and eustachian tubes moderate; tympanum rounded, distinct. Vomerine teeth in two oblique series, convergent behind, but with an interspace between.

Above yellowish brown, generally with a yellow dorsal band extending from the snout to the anus; upper parts with dark-brown, sometimes confluent spots; crown with two oblique

brown streaks, beginning on the upper eyelid, convergent towards behind, and separated by the yellow band; a brown streak from the eye along the canthus rostralis; beneath nearly uniform white. Males with the throat and vocal sacs brown.

The largest specimens measure 2 inches or somewhat more in length; their hind legs $2\frac{1}{2}$ or $2\frac{3}{4}$ inches, the males having the toes a little more slender than the females. This species is found in the Peninsula of India and at Simla, where it was discovered by Messrs. von Schlagintweit; it is said to occur also in Ceylon, but it must be very local there, as we have never received it from that island. With the aid of its shovel-like metatarsal tubercle it burrows in the ground to a depth of $1\frac{1}{2}$ foot.

We have seen coloured figures of Mr. Jerdon's *Pyxicephalus fodiens* and *P. pluvialis*, in the possession of Walter Elliot, Esq., from which it is evident that they are identical; the figure representing the *P. pluvialis* is taken from a male.

PYXICEPHALUS RUFESCENS.

Pyxicephalus rufescens, Jerdon, *Journ. As. Soc. Beng.* 1854, p. 534.

"Of a rufous colour above, whitish beneath; body rough and granulose; limbs barred. Length $1\frac{1}{2}$ inch; hind leg $2\frac{1}{6}$ inches; foot $\frac{1}{2}$ inch. Not rare in gardens on the Malabar coast."

I have not seen an example of this frog; but there is an elaborate coloured drawing in the collection of Walter Elliot, Esq., which seems to represent this species, although it is not named. It would appear from it that *P. rufescens* is very similar in habit to *P. breviceps*, having, however, the skin coarsely tubercular. The eye, also, is comparatively much smaller; the interdigital membrane of the hind foot is as short as in the other species.

MEGALOPHRYS, Kuhl.

Fingers quite free; toes with a short but distinct interdigital membrane. Head and body much depressed; eyelid prolonged into a triangular flap; cleft of the mouth large. Vomerine teeth present. Tongue circular. Tympanum hidden; openings of the eustachian tubes of moderate width. Male without vocal sac.

Only one species is known.

Note.—Mr. Blyth refers two Batrachians to the genus *Megalophrys*, viz. *M. gigas* (*Journ. As. Soc. Beng.* xliii. p. 299) from Sikkim, and *M. guttulata* (*ibid.* xxiv. p. 717) from Pegu. The characters given are perfectly useless, as none of these frogs belong to the genus *Megalophrys*; they have not the eyelid

prolonged. One of them has broadly webbed hind toes, and is a "powerful leaper;" the other has them but slightly webbed, being a "crawler" and tree-frog; nevertheless they are referred to the same genus! It is not at all improbable that the former is a true *Rana*!

MEGALOPHRETS MONTANA.

Female :—

Megalophrys montana (Kuhl), *Wagl. Syst.* p. 204. *Dum. & Bibr.* viii. p. 458. *Günth. Batrach.* Sal. p. 96.

Ceratophrys montana, *Schleg. Abbild.* p. 29. taf. 10. fig. 3.

Male :—

Ceratophrys montana, var., *Schleg. Abbild.* p. 30.

Megalophrys montana, *Cantor, Mal. Rept.* p. 140.

Ceratophryne nasuta, *Schleg. in litt.* *Günth. Batrach. Sal.* pp. 87 & 136. *Schleg. Handb. Dierk.* ii. p. 57. pl. 4. fig. 72.

Head very broad and depressed, with a sharp canthus rostralis; body rather broad and short. The upper eyelid is produced into a triangular flap, which is longer in the male than in the female. The tip of the snout terminates in a similar but shorter appendage in the male, whilst it is rounded and without appendage in the female. The cleft of the mouth is wide, much broader than long. The vomerine teeth are minute, and sometimes lost; they are implanted on two short linear prominences, which are on the same level with the choane, and run backwards in a straight line. The choane are somewhat larger than the orifices of the eustachian tubes. A bony ridge runs backwards from the eye to above the tympanum, which is covered by the skin, but becomes visible, after removal of the latter, as an oblong and rather small slit. Pupil vertically rhomboidal. Skin of the upper parts almost smooth, with a few folds and conical tubercles: one fold divides the occiput from the nape, and another runs along each side of the back; there is sometimes another transverse fold between the longitudinal ones on the middle of the back. Of the tubercles, one above each shoulder-blade, outside of the longitudinal folds, is the most constant: the males have almost always a black conical tubercle with a white tip in the centre of the sacral vertebra. Nearly all the other tubercles are on the side of the body and on the belly, but more numerous and more distinct in females than in males. In old individuals the skin has grown to the bones of the skull, and is thickened and hardened in the humeral region.

Limbs of moderate length, the length of the body being equal to the distance of the vent from the base of the inner toe. Toes distinctly but shortly webbed at the base. Soles of the feet without tubercles.

Darker or lighter greyish brown above, with the tubercle on the shoulder black; male with another black tubercle in the centre of the sacrum; a subtriangular blackish-brown spot edged with white on each side of the upper jaw, including the orbit. A large round dark-brown spot on the elbows, knees, and heels, and at the vent. Lower parts densely marbled with brown; male with a white blotch on each side of the chest; palms and soles dark brown. Iris rich golden brown, minutely reticulated with black.

A female specimen, said to be from Ceylon, 1 $\frac{3}{4}$ inch long, differs slightly from those of the Archipelago in having the snout a little more pointed, although not produced, and in the

absence of the humeral tubercles and of the occipital cross fold. A dark-brown subtriangular mark commences between the eyes, and extends nearly over the whole back.

This frog has been found at Pinang, in Java and Sumatra, in Ceylon, and in the Philippine Islands; it inhabits woods in hilly countries. Females are larger and more numerous than males; one of the former measures $3\frac{1}{2}$ inches, the hind limb being $4\frac{1}{4}$ inches long.

Megalophrys was founded on female specimens; and Cantor appears to have been the first naturalist who examined male individuals, but without being aware that the peculiarities observed by him were of a sexual nature. At the period when my 'Catalogue of Batrachia Salientia' was published, Prof. Schlegel acquainted me with a Sumatran frog, "similar to, but different from, *Megalophrys montana*," which he named *Ceratophryne nasuta*. The name *Ceratophryne* having a very different meaning from that of *Ceratophrys*, I suppose that he intended to establish a new genus for this frog, which I characterized from a small example received from Sir A. Smith. This example does not show any vomerine teeth, nor a web between the hind toes, and therefore there was every reason to believe that it represented a genus different from *Megalophrys*.

However, when Schlegel published a diagnosis of this supposed new form, I saw that the "*Ceratophryne*" of his MS. was in fact merely a misspelt form of the old generic name *Ceratophrys*, and that he never intended to establish a new genus for the Sumatran frog, although he considered it as the type of a new species. Meanwhile the British Museum received two old male individuals (one from Cantor's collection), from which it became evident that they are provided with vomerine teeth and with a very distinct interdigital membrane, and that they are only the male sex of *Megalophrys montana*.

XENOPHRYS, *Gthr.*

Fingers and toes tapering, free to the base. Lower jaw without prominent apophyses; the internal openings of the nostrils and eustachian tubes small; tympanum rather small and inconspicuous. No parotoids. The transverse processes of the sacral vertebra much dilated. Vomer with two separate prominences, which are apparently toothless. The upper eyelid is well developed, broad, with a sharp, prominent edge, but without appendages.

This genus is founded on a single species from the Himalayas.

XENOPHRYS MONTICOLA. (Plate XXVI. fig. H.)

Similar in habit to *Megalophrys montana*. Head broad, depressed, rather short; snout rounded, with its extremity prominent and obliquely truncated, so that it considerably overreaches the cleft of the mouth; canthus rostralis sharp; loreal region slightly concave; nostril below the canthus rostralis, in the middle between the eye and the end of the snout.

Eye of moderate size, prominent; upper eyelid with a sharp edge. Tympanum rather small, one-third as large as the eye. A linear fold runs from the hinder edge of the orbit over the tympanum towards the armpit. Cleft of the mouth nearly twice as broad as long; tongue large, not notched behind, only a small part of it being unattached to the gullet. There is a short, oblong prominence on each side of the vomer; it commences on a level with the hinder angle of the choanae and runs backwards in a straight line; it does not appear to bear any teeth, although these may be conspicuous in other specimens. The skin is perfectly smooth, but there is a linear Y-like fold on the nape, the angle being directed backwards. Limbs of moderate length, the length of the body being rather more than the distance of the vent from the heel. The third finger is considerably longer than the others, which are subequal. Metatarsus without tubercle; the fourth toe is not quite half as long as the body; the third is a little longer than the fifth.

Upper parts brownish olive; a triangular dark spot on the crown of the head; a brown spot below the eye, and a brown band along and below the supratympanal fold. Lower parts marbled with brown; fingers with brown rings.

I have examined two examples, from Sikkim and from Khasya. They are 19 lines long, the hind limb being 31 lines long.

CACOPUS, *Gthr.*

Uperodon*, *Dum. & Bibr.*

Head very short; mouth small; limbs short. A series of four papillae across the palate: one on the hind margin of each choana, and two on a pair of osseous prominences of the vomer. Tongue circular, scarcely notched behind. Tympanum hidden; openings of the eustachian tubes of moderate width. Toes slightly webbed; metatarsus with a pair of large compressed prominences. Male with a vocal sac.

Two species are known:—

Snout extremely short, without canthus rostralis *C. systoma*.

Snout short, with an obtuse canthus rostralis *C. globulosus*.

CACOPUS SYSTEMA.

Rana systoma, *Schneid. Hist. Amph.* i. p. 144. *Peters, Monatsber. Berl. Acad.* 1863, p. 82.

Engystoma marmoratum, *Cuv. Règne Anim.*

Uperodon marmoratum, *Dum. & Bibr.* viii. p. 749. *Günth. Batr. Sal.* p. 49.

Head very short, with the occipital region swollen, globular; snout extremely short, with-

* The correct spelling of this word would be *Hyperodon*, a name long previously given to a genus of Cetaceans. Besides, these frogs have no vomerine teeth.

out canthus rostralis; body thick; limbs short; skin in the loins broad and loose. Eye of moderate size, with the pupil round. Cleft of the mouth narrow and short. Two small and short prominences are situated on a level with the posterior margin of the choanæ; they do not bear any teeth; choanæ wide, much larger than the orifices of the eustachian tubes. Tympanum small, entirely hidden by the skin. Skin nearly smooth or somewhat glandular; a fold descends from the upper eyelid to behind the angle of the mouth. The hind limb is but little longer than the body; metatarsus with two large compressed tubercles, the inner being the larger, and in advance of the outer. Toes short, distinctly but shortly webbed. Reddish olive, marbled and mottled with brown, the markings being sometimes undulated, or reticulated. Males with a large subgular vocal sac of a brown colour, which opens by a pair of very wide slits.

This species is found in the Carnatic; it attains to a length of $2\frac{1}{2}$ inches, the hind limb being $2\frac{1}{2}$ inches long.

CACOPEUS GLOBULOSUS. (Plate XXVI. fig. K.)

Head short, with the occipital region somewhat convex; snout short, but considerably longer than in *C. systoma*; canthus rostralis distinct, but obtuse; body short and thick; limbs very short; skin in the loins broad and loose. Eye rather small, with the pupil round. Cleft of the mouth narrow, broader than long. Vomer with a pair of small prominences, situated on a level with the posterior margin of the choanæ; they do not bear any teeth, but a small papilla is suspended from each of them; a similar smaller papilla, but without bony base, on the middle of the hinder margin of each choana; choanæ wide, half as large as the eye, and much larger than the narrow orifices of the eustachian tubes. Tympanum small, entirely hidden by the skin. Skin smooth; a fold descends from the upper eyelid to behind the angle of the mouth. The hind limb is as long as the body; metatarsus with two large, compressed, subrescentic contiguous tubercles, the inner being much the larger, and in advance of the outer. Toes short, one-third webbed. An old female is uniform brown; a young specimen has the back irregularly spotted with brown.

I have seen two specimens of this species, both of which were brought by Dr. Trail from Russelconda (Madras Presidency); the younger is 13 lines long, the larger (a very old female) 34 lines long. The former is distended by fluid in an extraordinary manner, so that the body has the shape of a ball, from which the head and limbs project. The fluid is contained in the abdominal cavity. The larger individual is distended in a similar way, but this is caused by an extraordinary development of the ovaria; these organs become so large, that, not having room in the abdominal cavity, *they extend right across the back, where they coalesce*, so that the body of the animal is entirely surrounded by the mass of the ovaries: in this specimen I could find the division between the right and left ovaries on the abdominal side, but not on the dorsal.

DIPLOPELMA, *Gthr.*

Head small, with rather pointed snout; mouth narrow; body thick; upper arm and thigh rather short. Teeth none, in jaws or on the palate. Tongue elongate, ovate, entire behind. Tympanum hidden; openings of the eustachian tubes very small. Skin smooth; fingers free, toes one-third webbed; metatarsus with two obtuse tubercles. Male with a single sub-gular vocal sac.

Only two species are known*.

The length of the body is somewhat more than the distance between vent and heel. *D. ornatum*.

The length of the body is somewhat less than the distance between vent and heel. *D. pulchrum*.

DIPLOPELMA ORNATUM.

Engystoma ornatum, Dum. & Bibr. viii. p. 745.

Diplopelma ornatum, var. A., Günth. *Batr. Sal.* p. 50.

Reddish- or greyish-olive above, with or without a darker subtriangular spot on the back, commencing on the nape and becoming broader as it extends to the hind part of the body. A brown or purple band commences behind the eye and runs along the side; join with some deep-brown spots; a dark-brown band from the hip to the thigh, another from the vent along the hinder side of the thigh; limbs with a few brownish cross bars. Whitish below; throat brownish in the male.

The length of the body is somewhat more than the distance between vent and heel; toes one-third webbed.

This is one of the smallest Indian frogs; it is a local species, appearing in great numbers after showers of rain in November. We have received it only from the Madras Presidency, but it appears to occur in other parts of Southern India and in Ceylon. One of the largest specimens is 1 inch long, the hind limb being $1\frac{1}{2}$ inch.

DIPLOPELMA PULCHRUM.

Diplopelma ornatum, var. B., Günth. *Batr. Sal.* p. 50.

Engystoma pulchrum, Hallow. *Proc. Acad. Nat. Sc. Philad.* 1860, p. 506.

Yellowish- or greyish-olive above, with brownish markings edged with black and white;

* Mr. Jerdon mentions four species of *Engystoma* from the Peninsula of India, but without properly characterizing them (*Journ. As. Soc. Beng.* xxii. p. 534); Mr. Blyth describes the colours of two other frogs from Pegu, adding that they are not true *Engystomes*, viz. *Engystoma* (?) *interlineatum*, *Journ. As. Soc. Beng.* xliii. p. 732 and xxiv. p. 720, and *Engystoma* (?) *berdmorei*, *ibid.* xxiv. p. 720.

these markings are concentrically arranged, forming V-like bands with the point directed forward; one is always darker and broader than the others, and those on the hind part of the trunk are more or less broken up into oval or round spots. A cross band of the same colour between the eyes. Limbs with numerous similar cross bars. A brownish-black spot on each side of the vent. Lower parts yellowish; throat marbled with blackish in the male.

The length of the body is somewhat less than the distance between vent and heel; toes one-third webbed.

This species is extremely similar to its congener from the Peninsula of India, but it appears constantly to differ in its coloration and in having somewhat longer limbs. It is very common in China (Ningpo, Hongkong), and lately we have also received some examples from Siam. Total length 13 lines, hind limb 24 lines.

BUFO, *auct.*

Snout rounded or truncated; limbs rather short. Teeth none. Tongue elongate-ovate, entire and free behind. Parotoids very distinct, swollen; skin more or less warty. Openings of the eustachian tubes of moderate width. Fingers quite free; toes generally half-webbed, sometimes entirely webbed. Males generally with a single vocal sac, which is not visible externally.

Toads are found in almost every part of the tropical and temperate regions, except Oceania and Australia. Their repulsive appearance, nocturnal habits, and the fetid smell of a milky secretion have rendered them objects of horror and superstition, although it is now almost universally known that they are the most harmless and even useful creatures. They generally come forth from their hiding-places towards dark, in search of food, which consists of worms, larvae, and slowly moving insects; they also make their appearance after showers of rain, picking up the insects and larvæ which drop from trees. When attacked by man or by an animal, they exude a milky fluid from the large gland situate on each side of the neck, which we call parotoid, and from the numerous smaller glands with which their body is covered. This fluid can be ejected to a distance of a foot or more from the parotoids; but, although of an offensive smell, it has no poisonous qualities, and will produce merely a slight erythema on a delicate skin; if accidentally carried into the eye, it is followed by slight pain and inflammation of the conjunctiva. However, this fluid is an excellent protection to toads, as almost all animals feeding on frogs reject them as food. I have found remains of toads only in very large, old snakes.

They live in damp, dark places, and enter the water only at the season of propagation. They are bad swimmers and leapers, their feet being short, with the interdigital membrane not well developed.

The following species are found in British India:—

- * *Crown of the head without elevated bony ridges.*
 No fold of the skin along the tarsus; lower part of the parotoid with a blackish band *B. vulgaris*, p. 419.
 A fold of the skin along the tarsus; a large gland on the upper side of the calf *B. calamita*, p. 420.
 Parotoid very narrow and elongate *B. kelaartii*, p. 421.
- ** *Crown of the head with a lateral bony ridge.*
 Parotoid much smaller than, and confluent with, the lateral ridge, which is obtuse *B. galeatus*, p. 421.
 Parotoid rather large, kidney-shaped; no fold of the skin along the tarsus *B. melanostictus*, p. 422.
 Parotoid small, subtriangular; a fold of the skin along the tarsus *B. asper*, p. 423.

BUFO VULGARIS. *The Common European Toad.*

- Rana bufo*, *L. Syst. Nat.* i. p. 354. *Roesel*, p. 85. tabs. 20 & 21.
Bufo vulgaris, *Laur. Syn. Rept.* pp. 28, 125. *Fische. Faun. Casp.-Cauc.* p. 127. tab. 31. *Dum. & Bibr.* viii. p. 670. *Günth. Batr. Sal.* p. 55.
 — cinereus, *Schneid. Hist. Amph.* p. 185.
 — palmarum, *Cuv. Règne Anim.*
Asiatic varieties:—
Bufo vulgaris japonicus, *Schleg. Faun. Japon. Rept.* p. 106. taf. 2. 6gs. 5 & 6.
 — gargarizans, *Cantor, Ann. & Mag. Nat. Hist.* 1842, ix. p. 483.
 — griseus, *Hallow. Proc. Acad. Nat. Sc. Philad.* 1860, p. 506.

Crown of the head quite flat, without elevated bony ridges; a groove between the eye and the parotoid. Parotoids oblong, elliptical, or ovoid, of moderate size, not longer than the head. Tympanum small, indistinct. Upper parts with numerous tubercles, which are sometimes horny at the top. Legs short, the length of the hind limb being not much more than that of the body. Soles with numerous small tubercles; metatarsus with two prominences, the inner of which is the larger; tarsus without fold. Toes half-webbed. Brownish above, uniform or marbled with darker; belly yellowish, without or with blackish spots, which are sometimes confluent, forming a network of blackish streaks. Chinese specimens with a more or less distinct light interocular band. A blackish band along the lower part of the parotoid.

The greater part of the Asiatic specimens which I have had an opportunity of examining are from different parts of China (Ningpo, Hongkong) and from the island of Chusan. The latter may be considered as typical specimens of *Bufo gargarizans*, as they were sent by Dr. Cantor to the Museum of the East India Company, whence they were transferred to the British Museum. Nearly all these specimens may be distinguished from European examples, as they have the tubercles of the body, the edge of the maxillaries, the superciliary margin, and the surface of the parotoids covered with a thin brown horny layer, which I have never observed in our European toad. The latter has also the tubercles of the back of a more

equally round shape, whilst in Chinese specimens, especially in those from Chusan, some tubercles are considerably larger than the others and of a more elongate shape, as if two tubercles had melted into one. This, however, does not appear to me to amount to a specific difference.

Of greater importance might be considered another difference, viz. the length of the hind leg. This is conspicuously longer in almost all the English and German specimens than in those from China; and if this character had been constant, I should not have hesitated to adopt *B. gargarizans* as a valid species. However, several specimens collected in Devonshire agree in this respect with the Chinese, and specimens from Sicily are exactly intermediate forms; so that this character also cannot be taken as one of specific value.

Our specimens from Japan have the upper surface of the skull a little more concave* than in the European toad, but in other respects—form of the tubercles, length of hind limb, &c.—it appears to be still more closely allied to the latter than the Chinese.

Finally, we have received specimens from Messrs. v. Schlagintweit, collected in the Himalayas at altitudes of from 5900 to 10,200 feet, which much resemble our common toad. However, the specimens are not in a good state of preservation, leaving some doubt as regards their specific identity with that species.

This species extends from Western Europe, through the temperate parts of Central Asia, to China and Japan. We have lately received examples from the Mauritius also, but it is almost certain that they were not indigenous in that island, but imported from France. Some of the Chinese and Japanese specimens are of as large a size as may be observed in our European toad, whilst none of the Chusan examples exceed a length of $2\frac{1}{2}$ inches.

BUFO CALAMITA. The Natter Jack.

Roesel, Hist. Ran. taf. 24.

Bufo calamita, Laur. Syn. Rept. p. 27. Günth. Batr. Sal. p. 57.

Crown of the head quite flat, without elevated bony ridges; a narrow groove between the eye and the parotoid. Parotoids oblong, elliptical, of moderate size, shorter than the head. Tympanum indistinct, considerably smaller than the eye. Upper parts granulated with scattered wart-like tubercles. Legs short, the length of the hind limb being not much more than that of the body. A large, elliptic, parotoid-like gland on the upper side of the calf. Soles with numerous small tubercles, metatarsus with two flat prominences; a fold of the skin runs along the inner edge of the tarsus. Toes half-webbed. Brownish- or greenish-olive above, with rounded or kidney-shaped brown spots, one of which occupies the middle of each upper eyelid. Lower parts yellowish, with small black spots. Generally a yellowish vertebral line.

This species is found in many parts of Europe; it occurs also in Tibet, whence we received an adult example with many young ones. It rarely exceeds a length of $2\frac{1}{2}$ inches.

* Dr. Lütken describes an Indian toad with concave skull, *Bufo stomaticus*; it is not known from what country this species comes (Naturh. Foren. Vid. Meddel. 1862).

BUFO KELAARTII.

Bufo kelaartii, *Günth. Batr. Sal.* p. 140. pl. 10. fig. A.

Adenomus badioflavus, *Cope, Proc. Acad. Nat. Sc. Philad.* 1860, p. 371.

Crown flat, without bony enlargement; head triangular, with angular rough canthus rostralis and moderate muzzle; extremities moderate. Fingers rather long and slender, quite free, carpus with a blunt flat tubercle; toes rather short, broadly webbed; metatarsus with two small blunt tubercles; no cutaneous fold along the edge of tarsus. Skin tuberculous, rough; a very narrow parotoid from the tympanum nearly to the middle of the side of the back; outer edge of upper eyelid rather prominent, with a convex series of rough tubercles. Nostrils lateral, but near the end of snout. Cleft of mouth moderate. Palate quite smooth, without any bony or membranaceous prominences, but with two longitudinal grooves. Tongue very narrow, elliptical, free and entire behind; inner nares moderate; eustachian tubes small; tympanum rather indistinct. Above brown, the back sometimes with lighter, sometimes with darker variegations; a lighter cross band between the eyes; extremities with indistinct cross bands. Belly yellowish, more or less distinctly brown-spotted, the spots more crowded towards the middle.

This species is peculiar to Southern Ceylon; the largest specimen observed is only 24 lines long.

BUFO GALEATUS. (Plate XXVI. fig. L.)

Crown of the head slightly concave; a very high, compressed, swollen osseous ridge on each side of the neck, commencing immediately behind the orbit, from which it is separated by a shallow groove. The parotoid is small, smaller than the osseous prominence, and confluent with it, so that, externally, no division is visible between them. Prominence and parotoid together as long as the head. Snout somewhat pointed, with a sharp canthus rostralis. The osseous margin of the orbit is slightly elevated. Tympanum as large as the eye, indistinct. Skin of the head smooth, of the upper eyelid granular, of the back with a few scattered flat and smooth tubercles. The sides of the body and the legs are covered with numerous conical tubercles, each terminating in a horny point. Limbs rather thin; the first finger is decidedly longer than the second. The length of the body equals the distance between the vent and the metatarsal tubercles. Toes shortly webbed, with numerous tubercles below; metatarsus with two flat tubercles equal in size; tarsus without longitudinal fold. Greyish brown above, beautifully marbled with chestnut-brown. Throat and chest rose-coloured, belly yellowish, all the lower parts with blackish spots.

We have received a single example from Gamboja; it is $2\frac{1}{2}$ inches long, the fore limb measuring $1\frac{3}{4}$ inch, the hind limb $3\frac{1}{4}$ inches, and the fourth toe (from the metatarsal tubercle) $\frac{1}{2}$ inch. The species is allied to *B. celebensis*, which, however, has the osseous ridge much smaller than, and separated by an incision from, the parotoid.

BUFO MELANOSTICTUS. *The Common Indian Toad.*

- Bufo melanostictus*, *Schneid. Hist. Amph.* p. 216. *Cantor, Mal. Rept.* p. 142.
 — *scaber*, *Daud. Rept.* viii. p. 194. *Schleg. Abbild.* p. 64. pl. 20. fig. 2. *Dum. & Bibr.* viii. p. 600.
 — *bengalensis*, *Daud. l. c.* p. 197.
 — *carinatus*, *Gray, Ind. Zool.*
 — *dubia* (*Shaw*), *Gray, Ind. Zool.*

Crown of the head deeply concave, the osseous orbital edge being much elevated; it bifurcates in front and behind the orbit, one branch of the anterior fork forming the canthus rostralis, the other descending vertically before the orbit. The upper branch of the hinder fork goes to the parotoid, the lower separates the tympanum from the orbit. Parotoids elongate, kidney-shaped, as long as, or rather longer than, the head. Tympanum very distinct, nearly as large as the eye (except in specimens from the Himalayas, in which it is smaller and generally hidden). Upper parts densely covered with tubercles and warts; generally a double series of larger ones runs downwards along the vertebral line, commencing with a pair of osseous tubercles in the nape of the neck. The tubercles, the parotoids, the ridges on the head, the maxillary edge, and the tips of the toes are very frequently covered with a brown horny substance. Legs short, the length of the hind limb being not much more than that of the body. Metatarsus with two prominences, the inner of which is not much larger, but considerably more prominent than the outer. Tarsus without longitudinal fold. Toes half-webbed. Adult specimens uniform brownish- or greyish-olive above; young ones marbled with brown on the back, and with blackish below.

The orbital ridge is much less developed in young specimens than in old ones, the head being almost flat in individuals the body of which is about one inch long. There is also a difference in the development of these ridges in specimens from different localities: in none have I seen them so much developed as in some old Ceylonese examples, in which they are from three to four lines high. This species varies also considerably in the number of tubercles—as, for instance, they are more numerous in examples from the Peninsula of India than in those from Ceylon, Pinang, or Java. Bornean examples are smoother than all the others, and I have seen specimens from that island with scarcely any tubercles on the back.

A form most aberrant from the typical specimens of this species is found in the Himalayas (in Sikkim and Nepal). The tubercles are very numerous and rough, small ones sometimes extending on to the crown of the head; the ridges of the cranium are very feeble; and the tympanum is generally entirely hidden. The legs also are somewhat longer, the length of the body being equal to the distance between the vent and metatarsal tubercles. Thus, this form might be separated as a distinct species on the same grounds as those on which "*Rana corrugata*" has been separated from *Rana kukhii*. But, on examination of several examples, we find that a few of them have the tympanum distinct, and that others have the hind limbs not quite so elongate as the majority, thus approaching the typical form of the lowlands. We may propose for this alpine form the name of *Bufo melanostictus*, var. *himalayanus*.

This is one of the most common Batrachians of the Indian region, and appears to inhabit every part of the continent and of the archipelago, from the peninsula of Southern India to

China and the Philippine Islands; in the Himalayas it ascends to an altitude of 9000 feet. We have never received it from New Guinea or from any of the Indo-Australian islands. It attains to a length of 5 inches. Cantor says that it utters a chirping, plaintive sound.

Duméril and Bibron (Erpét. gén. viii. p. 702) describe a species, *Bufo isos*, as very similar to *B. melanostictus*, but provided with narrow, elongate, tapering parotoids, and with toes entirely webbed. They state that they received two examples from Bengal. It would be very singular that this species should never have been sent to any of the British collections, if it really be a Bengal species. However, we have lately received the typical specimen of Dr. v. Bleeker's *Bufo gymnauchen* from Bintang (Nat. Tydschr. Nederl. Ind. 1858, xvi. p. 46), a species so similar to Duméril and Bibron's *B. isos* that we believe them to be identical. There is only one point in which Duméril's description does not agree with our specimen, viz. in the length of the first and second fingers, which are said to be equal in *B. isos*, whilst the first finger is the longer in *B. gymnauchen*, although Bleeker also describes them as equal. If the toes be laid side by side, they appear to be equal; but if their actual measurements are taken, the greater length of the first finger is at once conspicuous. The figure illustrating the *Bufo isos* in Bélanger, Voyage aux Indes Orientales, Rept. pl. 7, is monstrous.

BUFO ASPER.

Bufo asper, Schleg. *Abbild.* p. 63. taf. 20. fig. 1 (not good). *Dum. & Bibron*. viii. p. 668.

Crown of the head concave, the orbital edge being swollen, and continued posteriorly into a short, obtuse protuberance. Parotoids small, subtriangular, separated from the protuberance by a fold. Tympanum distinct, but very small; eyes prominent, with the upper eyelid broad. Canthus rostralis angular. Upper and lateral parts covered with numerous larger and smaller tubercles, each with a small horny point; the crown of the head and the snout are also tubercular. A very conspicuous groove along the vertebral line. Legs not very short, the length of the body being equal to the distance between the vent and the metatarsal tubercle. Metatarsus with two rather small, subequal, elliptic tubercles; a cutaneous fold along the inner side of the tarsus. Toes nearly entirely webbed. Uniform brown above, yellowish below.

This species is found in Java, Borneo, Celebes, Sumatra, and in Mergui; it attains to a length of $5\frac{1}{2}$ inches. Its physiognomy is very peculiar, in consequence of the prominent eyes and of the short snout, with angular canthus rostralis and perfectly vertical loreal regions.

HYLORANA, *Tschudi*.

Skin smooth, generally a glandular fold along each side of the back. Vomerine teeth present. Tongue elongate and deeply notched behind. Tympanum distinct. Limbs generally slender; fingers quite free, toes broadly webbed; disks of the fingers and toes not much developed.

Although the name of this genus is incorrectly formed, we have preserved it, not only

because it is prior to *Limnodytes*, but also because it well expresses the natural characters of these frogs. The form of the head and body and the length of the limbs are very similar to those of *Rana*, whilst the more or less dilated extremities of the toes indicate a semiarborescent life; they are very powerful leapers. The species are not very numerous, and have been found hitherto in the East Indies, Western Polynesia, Madagascar, and West Africa. The following are found in British India:—

* *Two glandular folds along each side of the trunk.*

The length of the fourth toe is two-thirds of that of the body *H. macrodactyla*, p. 424.

The length of the fourth toe is one-half of that of the body; web extending to the end of the fifth and third toes *H. erythraea*, p. 425.

The length of the fourth toe is somewhat more than one-half of that of the body; web not extending to the end of the fifth and third toes *H. macularia*, p. 425.

The length of the fourth toe is less than one-half of that of the body *H. malabarica*, p. 426.

** *Only one glandular fold along each side of the back, none on the side of the belly.*

Disks of the fingers and toes well developed *H. temporalis*, p. 427.

It is impossible to identify the following frogs, the descriptions by which they have been characterized being perfectly useless:—

1. *Limnodytes* (?) *phyllophila*, Jerdon, Journ. As. Soc. Beng. xxii. p. 532.—Western forests of the Peninsula of India.

2. *Limnodytes lividus*, Blyth, *ibid.* xxiii. p. 299.—Colombo.

3. *Limnodytes nigrovittatus*, Blyth, *ibid.* xxiv. p. 718.—Tenasserim.

4. *Limnodytes mutabilis*, Kelaart, Prodr. Faun. Zeyl. ii. p. 19.—Cotta, near Colombo.

5. *Limnodytes maculata*, Kelaart, *l. c.*—Galle.

HYLORANA MACRODACTYLA.

Hylarana macrodactyla, Günth. *Batrach. Sal.* p. 72. pl. 2. fig. C.

Habit very slender. Head much elongate, with flat crown, rather rounded canthus rostralis, and long pointed muzzle; upper jaw reaching far beyond the lower one; loreal region grooved; nostril oval, lateral, just below the canthus rostralis, nearer the end of snout than the eye. Eye moderate, prominent; tympanum large, nearly the width of the eye, just above the angle of mouth. Limbs slender, with small, rather indistinct disks; fingers quite free, the third much the longest, first and second nearly equal in length, the fourth rather longer; subarticular tubercles moderate; toes very long and slender, half-webbed, fourth much the longest, two-thirds of the length of the body; fifth longer than the third; at the base of the first finger a tubercle, rather smaller than the subarticular ones. Skin quite smooth, only the hinder part of the under side of the thigh granular; a glandular fold from the back edge of the eye along the sides of the back; another glandular fold from the angle of the mouth along the sides of the belly. Cleft of mouth long; tongue large, very long, deeply notched behind; palate very narrow; interior nostrils moderate, eustachian tubes rather larger; vomerine teeth in two oblique series, convergent posteriorly, between the inner nostrils. Above olive, with three parallel white stripes, one from the muzzle to the anus, and the two others along the glandular folds, some brown spots between; sides of body

black-spotted; loreal region blackish, with a white streak from the end of snout, passing between tympanum and angle of mouth; limbs with irregular spots and streaks above; under parts uniform yellowish.

Hongkong. Length of body $1\frac{1}{2}$ inch; length of cleft of mouth $\frac{1}{2}$ inch; length of front limb $\frac{3}{4}$ inch; length of hind limb 3 inches.

HYLORANA ERYTHREA.

Hyla erythraea, Schleg. *Abbild.* p. 24, tab. 9, fig. 3.

Hylarana erythraea, Tschudi, *Batr.* p. 78.

Limnodytes erythraeus, Dum. & Bibron, *viii.* p. 511, pl. 88, fig. 1 (bad). Cantor, *Mal. Rept.* p. 141.

Of rather slender habit. Head elongate, with the snout somewhat pointed, and with the canthus rostralis rounded; upper jaw prominent beyond the lower; loreal region longitudinally concave; eye rather large, larger in circumference than the tympanum. Limbs moderately slender; disks of the fingers and toes not well developed; fingers long, the first and fourth nearly equal in length, and somewhat longer than the second. The length of the body is rather more than the distance of the vent from the heel; toes of moderate length, the length of the fourth being scarcely more than one-half of that of the body; the interdigital membrane is broad, extending to the tip of the fifth and third toes; metatarsus with a small tubercle at the base of the first toe. Skin smooth; a glandular fold runs from the hinder angle of the orbit, along each side of the back; a second commences between the tympanum and the angle of the mouth; it is interrupted above the humeral joint, and continued along each side of the belly. Ground-colour olive-green during life, changing into a reddish-olive in preserved specimens. The two glandular folds on each side and the margin of the upper lip are white; hind limbs punctulated with brown.

This species belongs to the fauna of the Archipelago, being found in Sumatra, Java, and in the Philippine Islands, extending into Oceania (San Christoval, Salomon Islands); on the continent it has been found hitherto only in the Malayan Peninsula and on the south coast of Siam.

Length of the body 2 inches 8 lines, of the hind limb 4 inches 7 lines, of the fourth toe 1 inch 5 lines.

HYLORANA MACULARIA. (Plate XXVI. fig. C.)

Limnodytes macularius, Blyth, *Journ. As. Soc. Beng.* 1855, xxiii. p. 299.

Slender in habit. Head elongate, with the snout pointed, and with the canthus rostralis rather obtuse; upper jaw projecting beyond the lower; loreal region scarcely concave. Eye of moderate size, as large in circumference as the tympanum. Limbs slender*, tips of the

* Mr. Blyth says that this species has shorter and stouter limbs than *H. erythraea*, but it appears that he has never identified the latter.

fingers and toes scarcely dilated into disks. Fingers long: the first a little shorter than the fourth, and both longer than the second. The length of the body equals the distance between vent and heel; toes rather long, the length of the fourth being somewhat more than one-half of that of the body; the interdigital membrane does not extend to the last phalanx of the fifth and third toes; metatarsus with two tubercles, the one at the base of the first toe being the larger and rather elongate. Skin smooth: a narrow glandular fold runs from the hinder angle of the orbit along each side of the back; a second commences between the tympanum and the angle of the mouth; it is interrupted above the humeral joint, and continued along each side of the belly. Greenish- or reddish-olive above, with an irregular series of more or less confluent brown spots along the vertebral line; the series bifurcates at the base of the caudal vertebra. The dorsal glandular fold is greenish, with a black inferior border, which is continued along the canthus rostralis. A white streak along the upper lip and along the lateral fold. Sides of the body between the two glandular folds brown, marbled with darker; lower parts whitish, throat sometimes marbled with brown; an oblique brown streak on the humeral joint. Hind limbs spotted and reticulated with black.

This species appears to be limited to Ceylon; it attains to a length of $2\frac{1}{2}$ inches, the hind limb being $4\frac{1}{2}$ inches long, and the fourth toe $1\frac{1}{2}$ inch. The male has a small external vocal sac of brown colour below each corner of the mouth.

HYLORANA MALABARICA.

? *Rana sanguineo-maculata*, Less. in *Bélang. Voy. Ind. Orient. Zool.* p. 328, *Rept.* pl. 5. fig. 2.
Rana malabarica, Dum. & Bibr. viii. p. 365. pl. 86. figs. 1 & 1 a.

Moderately slender in habit. Head somewhat elongate, with the snout not much pointed, and with distinct canthus rostralis. Eye of moderate size, as large in circumference as the tympanum. Tips of the fingers and toes scarcely dilated into disks. The hind limb, if laid forwards, surpasses the snout by the length of the toes; interdigital membrane short; the fourth toe is one-half longer than the third and fifth. Skin smooth: a glandular fold runs from the hinder angle of the orbit along each side of the back; a second commences between the tympanum and the angle of the mouth, but it is not stated whether it is continued along the side of the belly or not. Brick-red above during life; a black band commences at the nostril and, passing through the eye and tympanum, is continued to the loin; it is spotted with white on the sides of the body. Upper lip with a white band. Limbs black, variegated with whitish and reddish.

This species is found on the coast of Malabar; one specimen is 2 inches 10 lines long, the hind limb having a length of 4 inches.

Mr. Jerdon (*Journ. As. Soc. Beng.* xxii. p. 532) mentions a species, which he calls *Rana curtipes*, from forests of the Peninsula of India. Mr. Walter Elliot has a coloured drawing of this frog, and I see from it that it belongs to *Hylorana*, and that it is very closely allied to, if it differ from, *H. malabarica*.

HYLORANA TEMPORALIS. (Plate XXVI. fig. G.)

Hylarana malabarica, *Kelaart, Prodr. Faun. Zeyl.* i. p. 191. *Günth. Batrach. Sal.* pp. 131 & 142 (not synonym.).

Of moderately slender habit. Head with the snout scarcely elongate, and with angular canthus rostralis; upper jaw slightly prominent beyond the lower; loreal region longitudinally concave; eye large, larger in circumference than the tympanum. Limbs moderately slender; disks of the fingers and toes well developed; fingers long, the first and fourth nearly equal in length and longer than the second. The length of the body equals the distance between vent and heel; toes of moderate length, the length of the fourth being a little less than one-half of the length of the body in full-grown specimens, and a little more in young ones. The interdigital membrane is broad, extending to the tips of the fifth and third toes; metatarsus with two tubercles, one at the base of the first finger being larger than the other and oblong. Skin smooth; a linear, quite rudimentary fold of the skin runs from the hinder angle of the orbit along each side of the back; no glands behind the angle of the mouth. Upper parts reddish- or yellowish-brown; a subquadrangular deep-brown spot occupies the space between the eye and humeral joint, covering the tympanum; this spot is well defined in adult specimens and edged with whitish, whilst in young ones it extends from the eye over the entire side of the body below the lateral fold. A black streak edged with whitish runs along and below the canthus rostralis; an indistinct whitish line along the upper lip. Lower parts whitish, throat and chest marbled with brown; an oblong, oblique dark-brown spot across the lower part of the humeral joint. Limbs with distant black cross bars.

From a repeated comparison of our specimens of this species with the description of Duméril's *R. malabarica*, it appears to me very probable that the Ceylonese frog is different from that of the Continent. The former has a somewhat different, but constant, coloration; its interdigital web is broad, the fourth toe is only one-third longer than the third and fifth, and, finally, its hind limbs are longer by the length of the whole tarsus. We have received it from Ceylon only.

Length of body 3 inches, of hind limb 5 inches, of fourth toe 1 inch $3\frac{1}{4}$ lines.

POLYPEDATES, *Dum. & Bibr.*

Skin smooth, rarely with tubercles; no glandular fold on the side of the back, a short fold from behind the eye above the tympanum. Vomerine teeth present (in adult specimens). Tongue elongate and deeply notched behind. Tympanum more or less distinct. Limbs of proportionate length; fingers shortly webbed, or free; toes broadly webbed. Disks well developed.

The arboreal habits of these frogs are indicated by the development of the terminal disks of their fingers and toes. They are found in almost every part of the East Indies and in

Madagascar. Most of them appear to have the power of changing their colours. The following species occur in British India:—

Synopsis of the Species.

Tympanum not much smaller than the eye; fingers slightly webbed. Back without parallel longitudinal bands	<i>P. maculatus</i> , p. 428.
Back with dark parallel longitudinal bands	<i>P. quadrilineatus</i> , p. 429.
Tympanum one-third the width of the eye; fingers scarcely webbed; heel without spur	<i>P. microtympanum</i> , p. 430.
Tympanum not quite one-third the width of the eye; fingers distinctly webbed; the hinder side of the thighs brown with white dots	<i>P. pleurostictus</i> , p. 430.
Tympanum one-third the width of the eye; fingers distinctly webbed; the hinder side of the thighs reticulated with black	<i>P. reticulatus</i> , p. 431.
A cutaneous spur at the heel	<i>P. equeus</i> , p. 431.
Tympanum very small; vomerine teeth in a straight line	<i>P. afghana</i> , p. 432.

Some other frogs have been noticed as belonging to this genus, but they have not been sufficiently characterized to distinguish them from their congeners, and it is doubtful whether they have been referred to the proper genus:—

1. *Polypedates* (?) *marinoratus*, Blyth, Journ. As. Soc. Beng. xxiv. p. 188.—Schwe Gyeu, Pegu.
2. *Polypedates lividus*, Blyth, l. c. p. 718.—Tenasscrim.
3. *Polypedates megacephalus*, Hallow. Proc. Acad. Nat. Sc. Philad. 1860, p. 507.—Hongkong.
4. *Polypedates stellata*, Kelaart, Prodr. Faun. Zeyl. i. p. 194. "Above bright green, with transverse darker bands and irregularly spotted white. Limbs barred brown and spotted white. Beneath pinkish white. Body oval. Total length about 2½ inches. Newera Ellia."

POLYPEDATES MACULATUS. The Common Indian Tree-Frog.

Hyla maculata, Gray, Ind. Zool.

— *leucomystax*, Gravenh. Delic. p. 26.

Polypedates leucomystax, Dum. & Bibr. viii. p. 519. Cantor, Mal. Rept. p. 142. Kelaart, Prodr. Faun. Zeyl. p. 193.

— *rugosus*, part., Dum. & Bibr. viii. p. 520.

— *cruciger*, Blyth, in Kelaart, Prodr. Faun. Zeyl. App. p. 48.

— *maculatus*, Günth. Batrach. Sal. p. 78.

Rather slender in habit. Head broad, with the snout of moderate length, and with distinct canthus rostralis; the crown of the head and the loreal region are concave. Eye large; the tympanum is not much smaller in circumference than the eye. The vomerine teeth are in two series, each commencing from the anterior angle of the choanæ; these series sometimes form a perfectly straight line, sometimes they are more or less oblique, convergent behind. The upper parts are perfectly smooth, and in old specimens the skin of the upper side of the head is adherent to the bone; a curved transverse osseous crest is more developed in specimens from Ceylon than in those from the Continent; it is always absent in young examples. None of the tubercles below the vent are enlarged, and the heels are without appendage. Limbs rather slender, the length of the body being equal to, or only a little more than, the distance between vent and heel. Disks large, those of the fingers considerably larger than

those of the toes. Fingers slightly, toes broadly, webbed, the interdigital membrane extending to the disks of the third and fifth fingers.

The coloration varies; the most constant markings are brownish cross bars on the limbs, small, more or less distinct, round white or whitish spots on the hinder side of the thigh, and a more or less developed white streak on the upper lip. This species has the power of changing its colours; it is sometimes buff above, sometimes ashy-grey, chocolate-brown, tinged with rose or lilac, black spots being more or less visible. In specimens preserved in spirits we observe the following variations:—

a. A more or less distinct cross band between the eyes; back with brown spots, but without an hourglass-shaped marking; a brown band runs along the canthus rostralis and is continued to behind the orbit and over the tympanum: Ceylon, Madras, Sikkim, Tenasserim, Gamboja.

β. A very distinct hourglass-shaped marking on the back, with or without a cross bar between the eyes; vent variegated with black and white; limbs with more or less distinct dark cross bars. Young specimens with a very distinct white streak along the upper lip; it is gradually lost with age: Ceylon.

γ. The hourglass-shaped marking is present, but its outlines are more or less irregular and undulated: China, Siam.

δ. Upper parts of a nearly uniform coloration.

This species is one of the most common frogs of Ceylon and of the continent of India. In the Himalayas (Sikkim) it ascends only to an altitude of 2780 feet; and, singularly, in Pinang it is absent in the valleys, whilst it occurs at an altitude of above 2000 feet. Females are much larger and much more numerous than males, the former attaining to a length of $3\frac{1}{2}$ inches, and the latter to that of $2\frac{1}{4}$, the hind limbs being respectively $5\frac{3}{4}$ and $3\frac{1}{2}$ inches long. I have not found any vocal sacs in the male.

POLYPEDATES QUADRILINEATUS.

Hyla quadrilineata, Wieg. *Act. Acad. Ces. Leop.-Carol.* 1835, p. 260. tab. 22. fig. 1.

Polypedates rugosus, part., *Dum. & Bibr.* viii. p. 520.

— *quadrilineatus*, Günth. *Batrach. Sal.* p. 79.

This species is very closely allied to *P. maculatus*, from which it differs only in the following points. It is brownish olive above, with four dark, black-edged longitudinal bands, two of which commence at the nose, the others in the superciliary region; sometimes the dark band crossing the tympanum is continued along the side of the body; limbs with cross bars of the same colour as the bands. Lower parts whitish. The vomerine teeth are always in two distinctly oblique, convergent series, which commence at a short distance from the anterior angle of the choane. The occiput is never elevated into transverse ridges.

This tree-frog belongs to the fauna of the Archipelago (Java, Philippine Islands), but it occurs also at Pinang and Singapore, as is the case with so many Archipelagic forms. Our largest individual is 3 inches long, the length of the hind limb being 5 inches.

POLYPEDATES MICROTYPANUM.

Polypedates microtypanum, Günth. *Batrach. Sal.* p. 77. pl. 6. fig. A.

Habit rather stouter than in *P. maculatus*. Head rather short, with broad flat crown, curved and angular canthus rostralis, and short rounded muzzle; loreal region somewhat grooved; nostril round, lateral, rather prominent, just below the canthus rostralis, nearer the end of the muzzle than the eye. Eye of moderate size; tympanum small, oval, one-third the width of eye. Limbs of moderate length; second finger much longer than first, fourth much longer than second, third rather longer than fourth; fingers with a very slight lateral cutaneous fold, scarcely webbed; subarticular tubercles very conspicuous; disks moderately developed; fifth toe as much longer than third as the disk is broad; toes half-webbed; a cutaneous fold reaching to the disks; subarticular tubercles very conspicuous; metatarsus with a small tubercle. Skin of back nearly smooth, or with a few scattered small tubercles; skin of the side and of the under parts tubercular; upper eyelids with some tubercles; a glandular curved fold from the back edge of the eye, above the tympanum, to the arm-pit. Choane and eustachian tubes rather small; a deep groove on each side of the palate; vomerine teeth small, in two very short oblique series between the choanae, with a large interval between. Colour above either nearly uniform bluish grey or olive, with regular black markings: a cross band between the eyes; a broad band on each side of the back, with a large interspace between, divergent in front and behind; limbs with black points and large cross bands; a black streak beneath the canthus rostralis and along the glandular fold; sides black-spotted; beneath yellowish, throat and chest finely dotted with black. Young specimens from Southern Ceylon sometimes have the lower parts entirely brown.

This species is peculiar to, and not uncommon in, Ceylon. An adult female measures $2\frac{1}{2}$ inches, the hind limb being $3\frac{1}{2}$ inches long.

POLYPEDATES PLEUROSTICTUS. (Plate XXVI. fig. I.)

Very similar to *P. microtypanum*, but with the fingers distinctly webbed. Head rather short; snout broad, with the canthus rostralis somewhat obtuse; loreal region slightly concave. Eye of moderate size; tympanum small, very indistinct, not quite one-third of the width of the eye. Limbs of moderate length; fingers with a very distinct web at the base; disks well developed; toes broadly webbed, the interdigital membrane extending to the disks of the third and fifth toes. Metatarsus with a small tubercle. The length of the body equals the distance between vent and heel. Skin of the back smooth, of the sides and of the belly finely granular; a curved glandular fold runs from the orbit, above the tympanum, towards the arm-pit. The vomerine teeth are very small, and occupy two short convergent ridges, each of which commences from the anterior angle of the choana. Upper parts greenish, with rather irregular kidney-shaped dark spots edged with lighter, one of them on each superciliary region; sides of the trunk with reticulated black lines, the intervals between the lines being yellow. Limbs with dark cross bars; the hinder side of the thighs brown, with white dots.

We have examined three specimens of this species, which are almost perfectly alike.

They are from the Madras Presidency. The largest is 2 inches long, the hind limb being $3\frac{3}{4}$ inches, and the fourth hind toe 10 lines.

It is possible that this species is the "Green Frog of the Neelgherries" of Mr. Jerdon, which he characterizes thus:—" *Polypedates variabilis*. Green, sometimes unspotted, at other times with gold spots or blackish spots; at times golden yellow, with brown spots; at other times brown, with darker spots. Length $2\frac{1}{4}$ inches; hind leg 4; foot $1\frac{1}{10}$." (Journ. As. Soc. Beng. xiii. p. 532.)

POLYPEDATES RETICULATUS. (Plate XXVI. fig. F.)

Similar in habit to *P. microtypanum* and *P. pleurostictus*, but readily distinguished by a peculiar coloration of the hinder part of the thighs, &c. Head large and broad, snout short, with angular canthus rostralis, and with the loreal region slightly concave. Eye of moderate size; tympanum distinct, rather small, one-third the width of the eye. Limbs of moderate length, the length of the body being equal to the distance between vent and heel. Fingers with a short but distinct web at the base; disks rather small; toes broadly webbed, the interdigital membrane extending to the disks of the third and fifth toes. A narrow moveable tubercle at the base of the first toe. Heel without cutaneous appendage; vent without large tubercles. Skin of the back with minute granules, and with a few very small white tubercles in the sacral region; sides and belly granulated. A linear fold of the skin runs from the orbit, above the tympanum, towards the arm-pit. The vomerine teeth occupy two strongly convergent ridges between the choanæ. Upper parts reddish olive, minutely dotted with brown; sides whitish with a rose-coloured tinge, and with an irregular network of fine black lines. Lower parts whitish, throat speckled with brown. Limbs with a few very indistinct dark cross bands; the hinder side of the thighs with a regular network of black lines.

I have seen only one example (female) of this species; it is $2\frac{1}{4}$ inches long, the hind limb being 4 inches, and the fourth hind toe 1 inch. It inhabits Ceylon.

POLYPEDATES EQUES. *The Spurred Tree-Frog.*

Polypedates eques, Günth. *Batrach. Sal.* p. 80. pl. 6. fig. B.

Habit slender. Head depressed, triangular, with broad flat crown, angular canthus rostralis, and pointed muzzle; loreal region grooved; nostril round, lateral, just below the canthus, nearer the end of snout. Eye large; tympanum elliptic, oblique, half as large as the eye. A narrow glandular fold from the back edge of eye, above the tympanum, to the shoulder; upper parts quite smooth, underside finely granular; anus surrounded by large prominent yellow tubercles. Fingers not webbed; disks of fingers rather broad, of toes moderate; second finger shorter than fourth; membrane between the toes reaching to half the length of fourth toe, and to the disk of the four other ones; fifth hardly longer than the third; at the base of the first a small tubercle. Heel with a skinny spur-like appendage. Eustachian tubes larger than the choanæ. Male with a slit on each side of the tongue, and with two internal

subgular vocal sacs beneath the angle of the mouth. Above greyish- or yellowish-olive, with a large hourglass-shaped black mark on the back, commencing between the eyes; an indistinct blackish-ash streak beneath the canthus rostralis; a yellow line from the end of snout, along the margin of upper lip, beneath the tympanum, to the base of leg; it disappears in old examples. Uniform yellowish beneath; hind limbs with darker cross bands. The tubercles round the vent are white or yellow.

This species is not rare in Ceylon, and does not attain to a large size; the largest example I have seen is $2\frac{3}{4}$ inches long, the hind limb being $4\frac{1}{2}$ inches long.

POLYPEDATES AFGHANA.

Polypedates afghana, Günth. *Batrach. Sal.* p. 81.

Similar in habit to *P. maculatus*. Snout of moderate length, not depressed, with very distinct canthus rostralis; nostril on the canthus rostralis, midway between the eye and the end of the snout. Tympanum very small, as large as one of the disks of the fingers, which are well developed. Vomerine teeth in a straight line, interrupted in the middle, and on a level with the posterior angle of the choanæ. Skin smooth. Fingers quite free; toes broadly webbed, the interdigital membrane extending to the disks. Metatarsus with a very small blunt tubercle. Upper parts brown, very finely speckled with greyish.

I have seen only one example, from Afghanistan; it is a female, 3 inches long, the length of the hind limb being 6 inches.

IXALUS, Dum. & Bibr.

Skin smooth or tubercular; no glandular fold on the side of the back. Vomerine teeth absent. Tongue elongate and deeply notched behind. Tympanum distinct. Limbs of proportionate length; fingers quite free, toes more or less broadly webbed; disks of the fingers and toes well developed.

The species of this genus are small Tree-frogs, hitherto found in Ceylon, Java, the Philippine Islands, and Borneo. They may be considered as *Polypedates* of small size and without vomerine teeth; and it is a curious fact that species of the latter genus want the vomerine teeth when young, and, therefore, that they can be distinguished from the *Ixali* only with great difficulty. Confusion may be avoided by ascertaining whether such small tree-frogs, which apparently belong to *Ixalus*, are really adult examples or merely young; if the latter be the case, they probably belong to a species of *Polypedates*, which has the vomerine teeth developed in mature age. Thus, for instance, specimens from Ceylon,

which I have formerly referred to *Ixalus aurifasciatus*, are young, and probably *Polypedates microtymppanum*. That species of *Ixalus* is not found in Ceylon. I am acquainted with the following species from British India:—

- No fold along the tarsus; hinder side of the femur coloured; web extending to the outer phalanx of the third and fifth toes *I. variabilis*, p. 433.
 No fold along the tarsus; hinder side of the femur coloured; web not extending to the outer phalanx of the third and fifth toes *I. temporalis*, p. 434.
 A fold along the tarsus; hinder side of the femur not coloured *I. femoralis*, p. 434.

Two other species have been referred to this genus, which I have hitherto failed to recognize:—

1. *Ixalus leucorhinus*, Martens, in Nomencl. Rept. Mus. Zool. Berol. 1856, p. 36. Toes not quite half-webbed. Yellowish brown with darker cross bands; thighs cross banded. A large six-sided white spot on the forehead; a band runs from the snout to the hip. Length of the body $\frac{3}{4}$ inch, of hind limb $1\frac{1}{4}$ inch. Ceylon.

2. *Polypedates* (?) *schmardana*, Kelaart, Prodr. Faun. Zeyl. ii. p. 22. "Above brownish grey; beneath white, posterior half of abdomen marbled with black. Eyebrows armed with spines. Back and sides tuberculated. Limbs studded with tubercular sharp-pointed spines. About $1\frac{1}{2}$ inch long. From Adam's Peak. This novel form of Tree-frog has no resemblance to any other found in Ceylon or Southern India."

This species has been identified by Prof. Peters with *Ixalus pœciopleurus*, Martens, Nomencl. Rept. Mus. Zool. Berol. p. 36; but when he at the same time (Sitzgsber. Acad. Wiss. Berl. 1860, p. 186) says that possibly *Ixalus variabilis*, Gthr., var. B., may also be identical with Kelaart's species, I must reply that not only not a single word of Kelaart's description justifies such an assumption, but that *Polypedates* (?) *schmardana* must be a very well-marked species and very different from *Ixalus variabilis*, which being very common must have been known to Kelaart, although he appears to have confounded it with young *Polypedates*.

3. *Ixalus* (?) *glandulosa*, Jerdon, Journ. As. Soc. Beng. xxii. p. 532, from Southern India, is perfectly unrecognizable.

IXALUS VARIABILIS.

Ixalus variabilis, Günth. *Batrach. Sal.* p. 74. pl. 4. figs. A & B.

Snout short, as long as the eye, rather obtuse in front, with angular canthus rostralis. Tympanum small, inconspicuous. Skin of the upper parts perfectly smooth. The length of the body is somewhat more than the distance between vent and heel. No fold of the skin along the tarsus; metatarsus with a single tubercle; the interdigital web extends to the outer phalanx of the third and fifth toes; disks of the fingers and toes rather broad. The coloration is very variable, but the anterior and posterior sides of the thighs are always coloured and spotted.

Var. *a*. Brownish- or greenish-olive above, whitish below; sides and hind parts of the thighs variegated with black and white. This variety is the most common.

Var. *b*. Greenish-olive above, with numerous large, irregular greyish-brown spots edged with violet; a cross band of the same colour between the eyes, and similar transverse bars on the limbs; lower parts whitish.

Var. γ . Greyish-olive above variegated with brown; a white line from the snout to the vent; hind limbs with undulated brownish lines, and with a few brown cross bars; lower parts uniform whitish.

Var. δ . Bluish-green, all the upper parts densely variegated with black; a white line along the canthus rostralis, superciliary, and supratympanic fold. Lower parts whitish, spotted with black.

This species has been found in Ceylon only, and does not appear to be uncommon. The largest specimen I have seen is $1\frac{1}{2}$ inch long, the length of its hind limb being $2\frac{1}{2}$ inches.

IXALUS TEMPORALIS. (Plate XXVI. fig. E.)

Snout of moderate length, longer than the eye, pointed, with angular canthus rostralis. The foremost part of the snout is on the same level with the nostril. Tympanum small, not quite half as large as the eye. Upper parts perfectly smooth. Disks of the fingers and toes well developed. The length of the body equals the distance between vent and heel; tarsus without cutaneous fold; metatarsus with a small tubercle; interdigital web short, not extending to the outer phalanx of the third and fifth toes; fingers quite free. Upper parts brownish- or greyish-olive; a dark cross band between the eyes, becoming lighter dorsad; a dark-brown band from the eye, over the tympanum, bent downwards to the humeral joint; loreal region generally brownish. Femur and lower leg with three brownish cross bars each, only the middle of which is distinct. Whitish below, throat dotted with brown.

I have examined six examples of this species, all alike in form and coloration; the largest are 15 lines long, the hind limb being 21 lines; they have the male and female sexual organs fully developed. Ceylon.

IXALUS FEMORALIS. (Plate XXVI. fig. D.)

Snout short, rather shorter than the eye, obtusely rounded in front, without canthus rostralis. Tympanum very small, covered by the skin. Skin on the back finely granular. The length of the body equals the distance between vent and heel; a narrow fold of the skin along the outer edge of the tarsus and fifth toe; metatarsus with a small indistinct tubercle; interdigital web short, not extending to the outer phalanx of the third and fifth toes; fingers quite free; disks of the fingers and toes well developed. Upper parts uniform greenish, the lower whitish; margin of the upper jaw, tarsus, and fore-arm white. The anterior and posterior sides of the femur are perfectly colourless, and only a narrow stripe along its upper side is green.

I have seen only one specimen of this species; it is from Ceylon, and 13 lines long, the length of the hind limb being 21 lines.

RHACOPHORUS, *Kuhl.*

Slender in habit; skin smooth. Fingers and toes entirely webbed, with the terminal disks very large. Vomerine teeth in two series, separated by an interval, and situated on a level with the anterior angle of the choanæ. Tongue large, elongate, free and deeply notched behind. Tympanum distinct; openings of the eustachian tubes rather small. Males with a simple internal subgular sac.

Three species are known: one, *Rh. reinwardtii*, is found in the eastern parts of the Archipelago, the second, *Rh. pardalis*, in the western, whilst the third inhabits Northern India.

RHACOPHORUS MAXIMUS.

? *Rhacophorus reinwardtii*, *Dum. & Bibr. Atlas*, pl. 89. figs. 1 & 1 a (not *Boie*).

Rhacophorus maximus, *Günth. Batrach. Sal.* p. 83.

Uniform dark violet above (green during life!), brownish below. Interdigital membranes not spotted. Vomerine teeth in two transverse slightly curved series, with a large interspace between them. Tympanum half the size of the eye.

We have received several examples of this frog from Nepal and from Sikkim, where it extends to an altitude of 5200 feet. Another specimen is marked as coming from Afghanistan. It is one of the largest Indian Tree-frogs, its body being 3½ inches long, and the length of its hind limb 6 inches.

HYLA, *Dum. & Bibr.*

Skin smooth, or with small tubercles; no large gland. Fingers and toes with the terminal disks well developed; toes webbed, fingers frequently connected by a more or less developed membrane. Tympanum distinct. Tongue large, subcircular, entire, or only slightly notched behind. Vomerine teeth present. Male with one or two vocal sacs.

The species of this genus are extremely numerous and spread over the greater part of the temperate and tropical regions; they appear to be absent in Tropical Africa and India. However, a form closely resembling the European Tree-frog is found in the north-eastern part of the latter region.

HYLA CHINENSIS.

Hyla arborea, var. *chinensis*, Günth. *Batrach. Sal.* p. 108. pl. 9. fig. C.

This frog is extremely similar to our common European Tree-frog; however, as a structural difference is always combined with a second, of coloration, it may be entitled to specific distinction, and the more so as it appears to be peculiar to China.

The general form of the head and body is the same as in *H. arborea*, the head being perhaps comparatively a little smaller than in that species. The length of the body is more than the distance between vent and heel. The tympanum is one-third the size of the eye: the vomerine teeth are placed in two small groups between the hinder part of the choanæ. A distinct fold across the chest. There is a short but distinct web between the fingers, and the web between the toes does not quite extend to the disks of the third and fifth toes. The back is uniform green, the lower parts white; several round or ovate black spots on the side of the body, in the loin, and on the hinder surface of the thighs; a broadish blackish band runs from the tympanum, through the eye, below the canthus rostralis, to the end of the snout.

This species is found in Southern China and on the island of Formosa, where it has been collected by Mr. Swinhoe*. It attains to the same size as *H. arborea*, the length of its body being 18 lines, and that of its hind limb 27 lines.

CALLULA.

Kaloula, Gray.

Head rather small, with short snout; body short, depressed; limbs short; cleft of the mouth narrow; eye rather small. Teeth none; a sharp osseous transverse ridge behind the choanæ; a fold of the mucous membrane runs across the palate, another further behind, before the œsophagus. Tongue free and entire behind. Openings of the eustachian tubes narrow; tympanum indistinct or hidden. Skin smooth, or with a few flat tubercles; no large glands. Males with a simple vocal sac, which opens by a pair of slits on the middle of the side of the tongue.

We are acquainted with four species of this genus, two of which belong to the fauna of the Archipelago†, and two to that of the continent and Ceylon.

* The Chusan Tree-frog perhaps belongs also to this species; Cantor enumerates it as *Hyla arborea*; but we have received an example from the East India Collection, which appears to have been sent by Cantor, although, unfortunately, the label has been lost. This specimen is a *H. chinensis*.

† Namely, *Callula balanta* and *C. picta*. The latter species, from the Philippine Islands, deserves par-

CALLULA PULCHRA.

Kaloula pulchra, Gray, Zool. Misc. p. 38. Günth. Batr. Sal. p. 123.

Hylodactylus bivittatus, Cantor, Mal. Rept. p. 143.

Snout very short and obtusely rounded; back with scattered flat and smooth tubercles. Limbs short, the length of the hind limb being equal to that of the body; fingers quite free, with the terminal disks well developed and truncated; the third finger is nearly as long as the free portion of the fourth toe. The skin of the hinder part of the body is so wide as to nearly entirely envelope the thigh. Toes short, with the extremities slightly swollen; the membrane at their base is very short. Tarsus without fold; metatarsus with two tubercles, the inner of which is disciform, nearly as large as the eye, and has a somewhat trencant edge; the outer tubercle is flat. Almost the entire back is occupied by a very large subtriangular brown, black-edged spot; it commences between the eyes, having its anterior apex truncated, and gradually becoming broader, terminates in the lumbar regions; it is sometimes divided by a black vertebral line. A broad yellowish (during life rose-coloured) band on each side of the back, both bands convergent towards, and confluent on, the forehead. An irregular oblique black band runs from behind the eye along the side of the anterior part of the trunk. The limbs and lower parts are marbled with brownish. Young specimens have a whitish spot on each of the principal joints of the limbs. Males have the throat deep brown.

This fine species is found in Ceylon, the Malayan Peninsula, Pegu, Mergui, Gamboja, Siam, and China. The largest individual we have observed (a female) is rather more than 3 inches long, the hind limb being of the same length.

ticular attention on the part of herpetologists. It was first described by Bibron as *Plectropus pictus*; then it was referred by myself to *Callula*. At the same time (Batrach. Sal. p. 123) I had an opportunity of examining some other Batrachians from the same locality, which were so similar to *Plectropus pictus* that I dared not separate them specifically, although they differed in the development of the disks of the fingers, in the form and size of the inner metatarsal tubercle, and in the greater width of the interdigital membrane. My specimen of *Plectropus pictus* was a male, the others (four in number) females.

The same two forms of Batrachians have lately been examined by Professor Peters (Monatshber. Acad. Wiss. Berl. 1863, p. 454); and he says that he observed a male and female of the slender-toed *Pl. pictus*, and a male of the broad-toed form: so that the differences would not be sexual. Professor Peters, although having only one example of the latter, considers it as a distinct species, perhaps as the type of a separate genus, naming it *Hylodactylus (Holonectes) conjunctus*.

Meanwhile, we have received two other specimens of the slender-toed form, which, without this observation of Professor Peters, would have confirmed me in my former opinion, as they, again, are males. However, this may be accidental; and I have only to add the following remarks:—

1. The inner metatarsal tubercle varies in size and form in our three specimens of male *Pl. pictus*: it is sometimes as large as the eye, disciform, broadly ovate, with eroded surface,—sometimes narrow, oblong, smooth, similar to that in our female specimens.
2. One of these males has one finger on one side much more dilated than the others.
3. All our females (*H. conjunctus*) have the interdigital membrane more developed than the males; in one specimen it extends to the last phalanx of the fourth toe on one side; on the other foot it is shorter.
4. None have teeth on the ridge behind the choanae, but a part of the edge of the ridge is unequally serrated.

CALLULA OBSCURA.

Snout short and depressed, but not obtuse in front; back with flat tubercles. Limbs of moderate length, the length of the hind limb being much more than that of the body; fingers quite free, with the terminal disks well developed and truncated. Thigh not enveloped by the skin of the trunk. Toes one-third webbed, of moderate length, with the extremities slightly swollen. Tarsus without fold; metatarsal tubercles indistinct. Brown above and below; the upper parts with black, the lower with whitish spots.

We have seen only one example of this species, and this is not in a good state of preservation. It is from Ceylon, and 15 lines long, the hind limb being 21 lines, and the fourth toe 6 lines.

THE ORDER OF TAILED BATRACHIANS—*BATRACHIA*
GRADIENTIA.

Body elongate, terminating in a tail, with four or two limbs, lizard-like.

The Tailed Batrachians have small teeth in both jaws and on the palate. They are either viviparous or deposit their eggs singly, attaching them to water-plants. Their tadpoles have externally visible gills, which in one family are persistent through the whole life of the animal, whilst they disappear in the greater number of the genera at as early a period as in the Tailless Batrachians. In others the gills are absorbed, but the gill-opening is never closed. The fore limbs are developed before the hind limbs.

The entire order is confined to the temperate regions of the northern hemispheres; and only recently one species has been discovered extending into the Indian region proper. I add another because it inhabits a part of China, the fauna of which bears a thoroughly Indian character. I have no doubt that by future researches in the Himalayas and in Formosa other additions will be made, although they must always be considered merely as outposts of the Palaearctic region.

CYNOPS, *Tschudi*.

Head of moderate size, body not elongate, tail compressed. Parotoids present; body without series of pores on the side; skin granular. Palatine teeth in two longitudinal series, divergent behind. Tongue narrow, scarcely free on the edges. Limbs well developed, toes four in front and five behind.

Two species are known, one from Japan and one from Northern China.

CYNOPS CHINENSIS.

Cynops chinensis, Gray, *Proc. Zool. Soc.* 1859, p. 229, pl. 19. fig. 1.

This species is extremely similar to its congener from Japan, *Cynops pyrrhogaster*, from which it differs in the coloration of the lower parts, which are of a deep bluish black with irregular yellow spots. The upper and lateral parts are uniform brown, and the tail has a narrow yellow inferior edge; tail of the male with a broad bluish longitudinal band along the middle of the side.

The parotoid is much less developed than in the Japanese species, being scarcely larger than the eye. Sides of the trunk with very numerous conical, prominent tubercles.

The male differs from the female in the form of the snout, which is much more produced and longer than the eye, whilst in the female it is obtuse and only as long as the eye. Otherwise the sexes do not differ, although our specimens have been caught during the spawning-season. The male has the lips of the cloacal orifice much swollen and covered with short and thin fringes.

The typical specimens were captured in a river, inland from Ningpo; they are $5\frac{1}{2}$ inches long, the tail measuring nearly 3 inches.

PLETHODON, *Tschudi*.

Head of moderate size; body cylindrical, more or less elongate; tail scarcely compressed. Parotoids none; body with vertical folds on the side; skin smooth. Vomerine teeth in a transverse series. Tongue more or less adherent to the bottom of the mouth. Toes four in front and five behind, not clawed.

The species of this genus are North American, but one has been discovered on the Indian continent.

PLETHODON PERSIMILIS.

Plethodon persimilis, Gray, *Proc. Zool. Soc.* 1859, p. 230, pl. 19. fig. 2.

This newt, as has been observed by Dr. Gray, is so similar to *Pl. glutinosus* from North America, that at the first glance they might be considered as identical. Its body, however, is considerably stouter and the limbs are more developed. The tongue also has a different form. We place the characters of both species side by side for easy comparison:—

Pl. glutinosus.

Limbs feeble.

The length of the fore limb is considerably less than one-half of the distance between fore and hind limbs.

The length of the hind limb is one-half of the distance between fore and hind limbs.

The third and fourth hind toes are much shorter than the cleft of the mouth.

Trunk with thirteen lateral cross folds.

Tail subcylindrical at the base.

Tongue large, covering the whole bottom of the mouth, its hind margin being free.

The series of palatine teeth is distinctly interrupted in the middle.

In other respects both species are very similar, the Siamese form being black, with small, scattered whitish spots.

The only two specimens known were collected by M. Mouhot in Siam. Unfortunately no mention has been made by him of the particular locality where they were obtained. They are from 3 to 4 inches long.

Pl. persimilis.

Limbs well developed.

The length of the fore limb is one-half of the distance between fore and hind limbs.

The length of the hind limb is considerably more than one-half of the distance between fore and hind limbs.

The length of the third and fourth hind toes equals that of the cleft of the mouth.

Trunk with twelve lateral cross folds.

Tail compressed at the base.

Tongue narrow, elliptical, not covering the whole width of the bottom of the mouth, without free posterior margin.

The series of palatine teeth is subcontinuous.

THE ORDER OF BURROWING BATRACHIANS—*BATRACHIA* *APODA.*

Body long, cylindrical, without limbs, worm-like.

These Batrachians had been placed by early zoologists among the Snakes. A tail is absent or extremely short. The skin is smooth and viscous, forming numerous annular folds; transverse series of rudimentary scales are imbedded in these folds, especially in those of the posterior part of the body. Their eyes are rudimentary, more or less hidden below the skin.

They constantly live below ground, burrowing like worms; their food appears to consist of mould and worms. The metamorphosis is less complete than in the two previous orders: the young do not live in the water, and have quite the external appearance of the old ones, but they are provided with short gills which do not project from the gill-openings. Gills and gill-openings disappear at an early period, and the perfect animal has only one lung developed, the other remaining rudimentary, as in most snakes.

Only three species are known from British India; they belong to two genera:—

A small round groove in front and below the eye *Epicrionus*, p. 441.

A small round groove below each nostril *Cecilia*, p. 443.

EPICRIUM, *Wagl.*

A small round groove in front and below the eye, near the labial margin.

Two species are known:—

- A yellow band along each side of the body *E. glutinosum*.
 Uniform black *E. monochroum*.

EPICRIUM GLUTINOSUM.

- Serpens Cœcilia ceylonica*, *Seba*, ii. p. 26, tab. 25. fig. 2.
Cœcilia glutinosa, *L. Mus. Ad. Fred.* p. 19. tab. 4. fig. 1.
 — *hypocyanea*, *Hasselt, Isis*, 1827, p. 565.
Epicrium hasseltii (*Filt.*), *Wagl. Isis*, 1828, p. 743.
 — *glutinosum*, *Dum. & Bibr.* viii. p. 286.

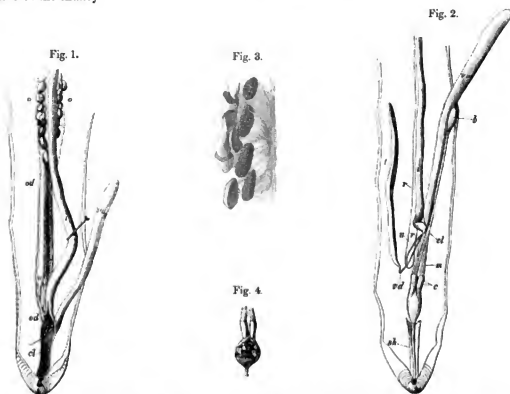
Head depressed, of moderate width; body subcylindrical, rather depressed; tail very short, although distinct, and generally pointed. The width of the head between the eyes equals the distance of the eye from the end of the snout. The skin above the eye is so transparent that the pupil and iris may be easily distinguished. The small groove on the lip encloses a short, slender, exsertile tentacle; when it is retracted, the groove has the appearance of being closed by a valve with an aperture in the middle. The cleft of the mouth is not much dilatable in a vertical direction, but it extends to behind the eye. The upper jaw overreaches the lower. Teeth numerous, small, subequal in size; they form a single uninterrupted series round the upper jaw, whilst the series on the palate is interrupted in the middle, each lateral half extending nearly as far backwards as the maxillary series. The mandible is armed with two series of teeth, an outer and an inner one. The tongue is longitudinally plaited, and nearly entirely grown to the bottom of the mouth, only a narrow margin remaining free.

The head and body are covered with a leathery skin, which is smooth and undivided on the head, but forms from 282 to 320 transverse folds from the neck to the end of the tail. These folds extend round the body only in its posterior part, whilst they are interrupted on the belly in its anterior and middle parts. The upper and lower parts are black; a yellowish band runs along each side of the body from the head to the tail.

This species is found in Ceylon, in Southern India, Khasya, Siam, Tenasserim, and Java; it attains to a length of 15 inches, the greatest circumference of its body being $1\frac{2}{3}$ inch.

I add a few observations on the anatomy of this species, especially on those points which have not been noticed before. All the intestines are elongate, as in snakes; the intestinal tract is almost straight, very simple in the female, whilst in the male the lower portion enters into intimate connexion with the sexual apparatus. The liver is large, long, divided into numerous transverse lobes, which are arranged like pieces of money in a roll. The gall-bladder is imbedded in the substance of the liver, not far from its tapering posterior extremity; the *ductus choledochus* is surrounded by a glandular body, which extends round the hinder part of the duodenum. The kidneys (*r, r*) are very narrow, tape-like, commencing just below the level of the heart, and extending downwards to the commencement of the cloaca (*cl*); the ureters (*u*) coalesce with the lowest part of the oviduct (*od* in fig. 1), the

oviduct and ureter of one side entering the cloaca by a common opening. Nearly opposite to these openings there is another foramen, leading into a long, tubiform urinary bladder (*vu*). The eggs (*o, o*), which in the female examined are of the size of a hemp-seed, and altogether fifty in number, are arranged in a single row along each side of the intestinal tract, extending upwards to behind the liver. The oviduct (*od*) is perfectly straight, running along the outer side of the kidney.



The cloaca of the male (fig. 2) is about 2 inches long in a specimen $11\frac{1}{2}$ inches in length; the intestinal tract (*i*) has a slight swelling and makes a short bend before it passes into the cloaca. The ureters (*u*), the vasa deferentia (*vd*), and the urinary bladder (*vu*) enter the cloaca at the same spot as the corresponding parts of the female, but instead of running downwards in a straight line, as in the female, the ureter and the vasa deferentia are bent upwards to meet the commencement of the cloaca, which in the male is more remote from the vent than in the female. The cloaca is divided into three portions: the upper is rather narrow, longitudinally plaited in its interior. The second is swollen, with a pair of lateral caecal appendages (*c*); there are four bilobed prominences (fig. 4) with a rather hard surface in its interior, whilst the caecal appendages are longitudinally plaited. Finally, the third or lower section is very narrow, and moves upwards and downwards in a cylindrical sheath of the peritoneum (*sh*).

A tape-like muscle (*m*) is attached to the end of each of the caecal appendages; both muscles coalesce behind the upper part of the cloaca, and ascend along the urinary bladder, to which they are loosely attached by cellular tissue. They terminate in a conical swelling (*b*), which

is slightly fixed to the walls of the abdomen above the middle of the length of the urinary bladder. I consider the middle portion of the cloaca as a copulatory organ, which after copulation is retracted by the long muscle attached to it; the bilobed prominences remind us of a similar structure of the copulatory organs of many Saurians.

The corpora adiposa (fig. 3) are large and numerous, and extend on each side along the whole length of the abdominal cavity; in some specimens I found them arranged in two rows on each side, those of the outer series being of the usual appearance, whilst those in the inner series are more regularly ovate and slightly compressed, with a coarsely granular surface, like an ovary. The granules can easily be detached from the mass of the adipose body; they are globular, of from $\frac{1}{4}$ to $\frac{1}{2}$ of a line in diameter, and are composed of a membranous coat, which is easily ruptured, and contains a fatty mass.

EPICRIUM MONOCHROMUM.

Ichthyophis glutinosus, var., *Cantor, Mal. Rept.* p. 137.

Epicrium monochrous, *Bleek. Nat. Tijdschr. Nederl. Ind.* 1858, xvi. p. 188.

This species is very similar to its congener, only differing in the following points:—the head is shorter, the distance between the eyes being more than the length of the snout. The inner series of mandibular teeth is short, and composed of a few teeth only. There are from 226 to 254 circular folds extending entirely round the body, except on the foremost part of the trunk; each fold forms an angle on the belly, the point of which is directed backwards. The whole body is uniform blackish brown, without lateral band.

I have examined only two examples of this species: the one from Singapore, and type of Cantor's description; the other from Sinkawang (Western Borneo), the type of the species, and sent by Dr. Bleeker to the British Museum. They are of nearly equal length ($9\frac{1}{2}$ inches), the circumference of the body being $1\frac{2}{3}$ inch.

CÆCILIA, *Wagl.*

A small round groove below each nostril.

The species belonging to this genus are either South American or African. Duméril describes one from the East Indies, which I have never seen.

CÆCILIA OXYURA.

Cæcilia oxyura, *Dum. & Bibr.* viii. p. 280.

Body short, moderately thick, its diameter being one twenty-fifth of the total length; it terminates in a pointed tail, which is somewhat prolonged beyond the vent. The subnasal grooves are vertically below the nostrils. The body is surrounded by 180 folds, the thirty last of which are completely annular, whilst the others do not extend across the vent, and are alternately longer and shorter. Uniform light-olive-coloured.

This species is said to be from the coast of Malabar, and about 12 inches long.

APPENDIX.

Page 176. *Typhlops tenuis*.

The specific name, being preoccupied by a species from Guatemala, is to be altered into that of *T. pammece*.

Page 236.

Reinhardt has just made a very interesting addition to our knowledge of Indian serpents in describing a species with an apparatus of gular teeth similar to that of the African *Dasypeltis*. The latter feeds on eggs of birds. The teeth in the jaws being extremely feeble and few in number, each of the hinder cervical vertebrae has an elongated inferior process, penetrating the walls of the œsophagus, and covered with enamel. The eggs in passing along this series of processes are broken, and having arrived so far downwards in the gullet that the mouth can be closed, none of the contents are lost.

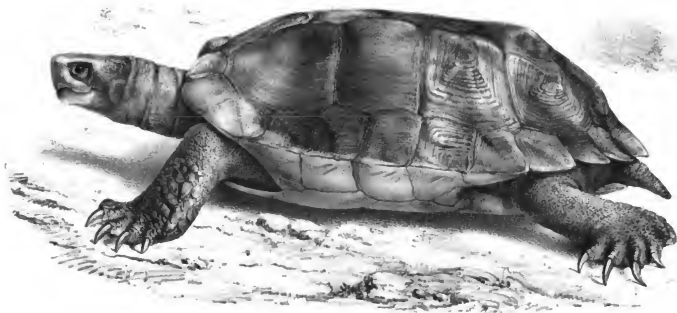
There are other snakes which, although feeding on eggs, have no gular teeth: several species of *Tropidonotus* devour the eggs of other reptiles, and in the stomach of *Dipsas irregularis* I have found perfect eggs of parrots.

It is possible that the processes on the base of the skull of *Nymphophidium* (p. 235) have to perform a function similar to that performed by the gular teeth of *Dasypeltis* and *Elachistodon*. Reinhardt places both the latter genera in one family; but it appears to me that *Elachistodon* is entitled to form a separate group of Colubridæ.

ELACHISTODON westermanni (Reinh. Vid. Selsk. Forhandl. Kjöbenh. 1863, December).

Teeth in the jaws and on the palate minute, few in number; maxillary with one or two small grooved teeth behind. Gular and œsophageal teeth formed by the inferior spinous processes of the vertebrae. Body and tail of moderate length; head scarcely distinct from neck. Scales smooth, in fifteen rows, those of the vertebral series being somewhat larger than the others, hexagonal. Eye of moderate size, with round pupil. Shields of the head normal: vertical broad, six-sided, with the lateral margins much convergent, and with an obtuse angle in front and behind. Nostril between two nasals; loreal oblong, entering the orbit; a small preocular above the loreal, not reaching to the upper surface of the head. Two postoculars. Seven upper labials, the third and fourth of which enter the orbit. Temporals two, elongate, both in contact with the postoculars. Ventrals 217; anal entire; 59 pairs of subcaudals. Brown above, with a yellowish vertebral stripe; a yellowish band commences on the snout and runs along each side of the upper surface of the head to the temporals and the angle of the mouth; an angular yellowish cross band on the neck; lower parts yellowish.

The only specimen known was obtained at Rungpore; it is an adult female, with seven elongate eggs in the oviduct; it is 31 inches long, the tail measuring $4\frac{1}{4}$ inches.



1/2





C



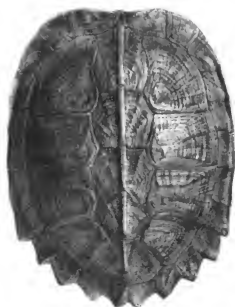
B½



C'



B'



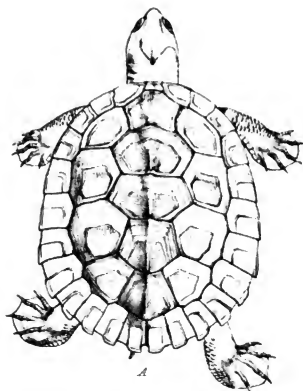
A



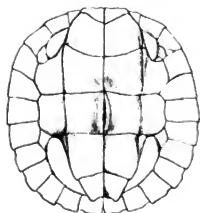
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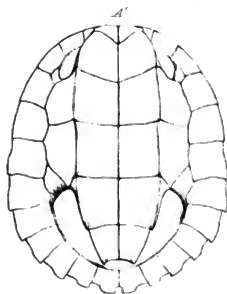
A''



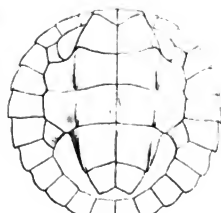
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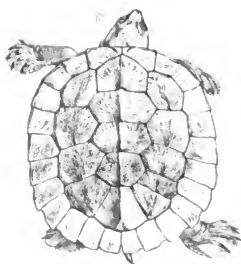
C'



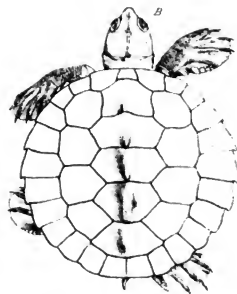
A'



B'

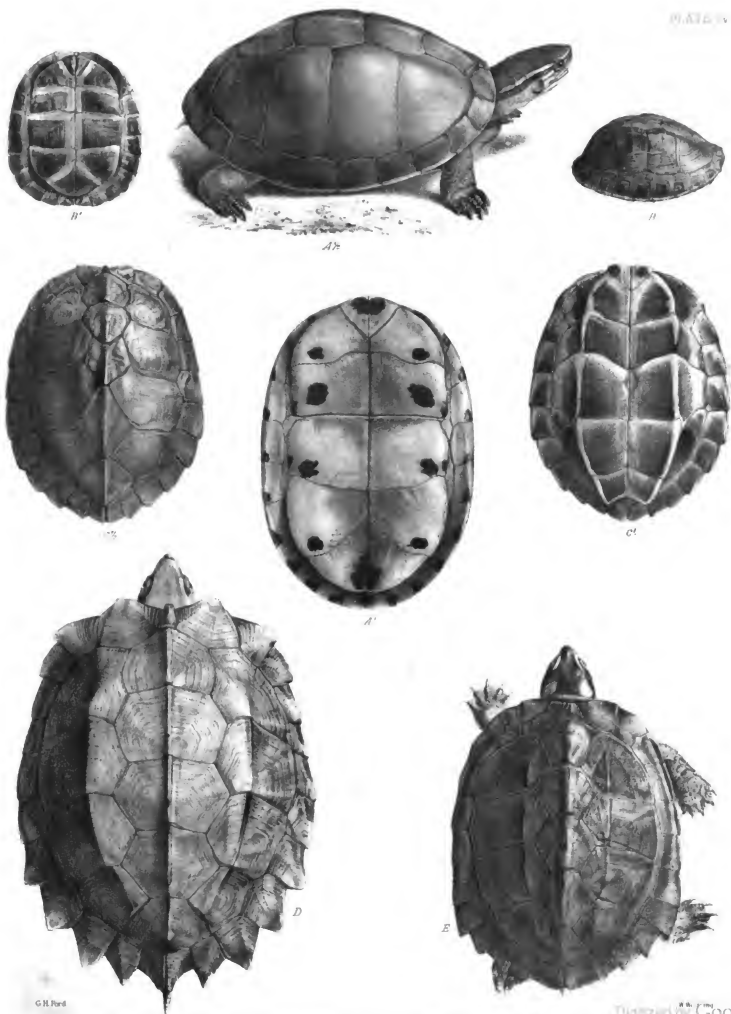


H. Ford



B

W. Wood, imp.



G.H. Ford

A A' *Guia umbrenensis*, fem. B, B' *Guia umbrenensis*, young. C, C' *Pseudocaretta ridgwayi*. D *Pseudocaretta ridgwayi*. E *Pseudocaretta ridgwayi*. F *Pseudocaretta ridgwayi*.



A



A'



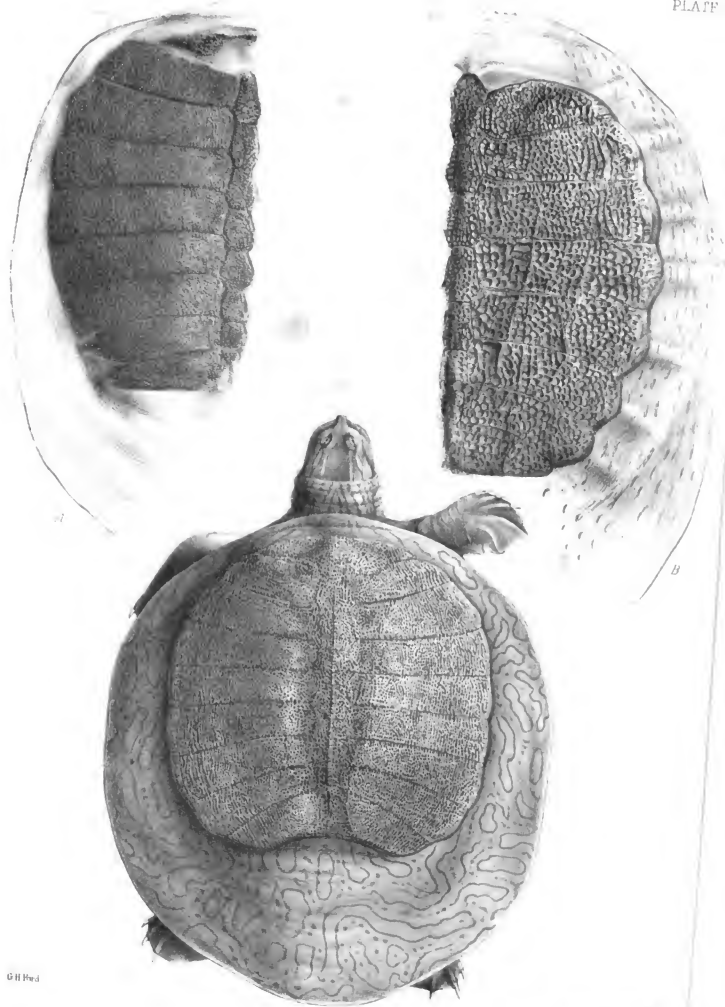
B



B



B'



G.H. Ford

C2

A. Thionyx guntheri. *B. Thionyx oratus.* *C. Chitra indica.*





D



E



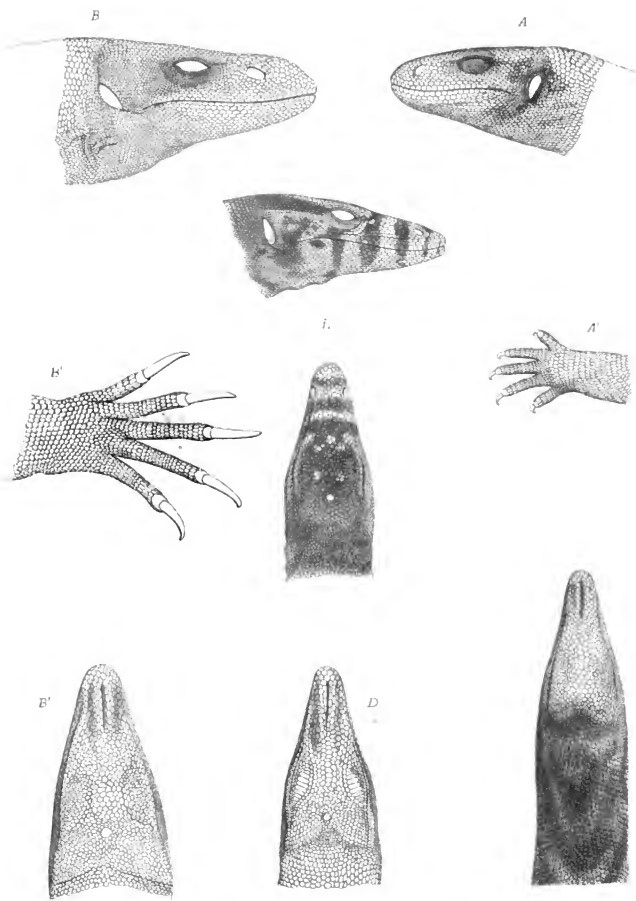
C



Gilford

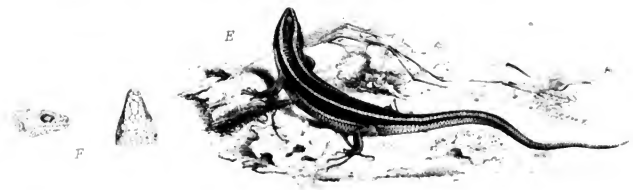
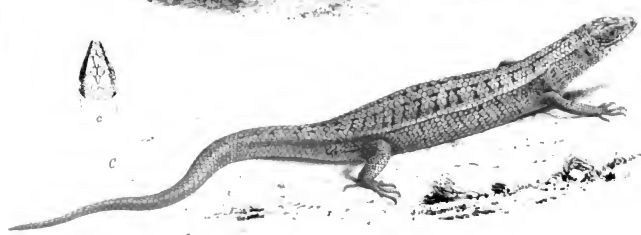
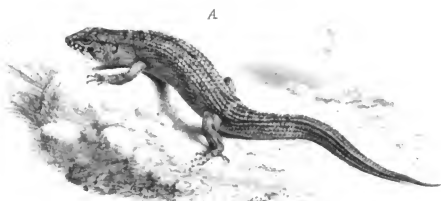
W. West, engr.

A. Crocodilus palustris. B. Crocodilus sumerensis
C. Tachydromus sax-lineatus D. T. meridionalis E. T. sri-lankensis



J. D. Smith, del.

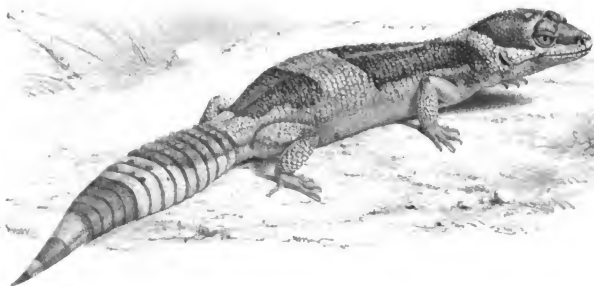
W. West, engr.



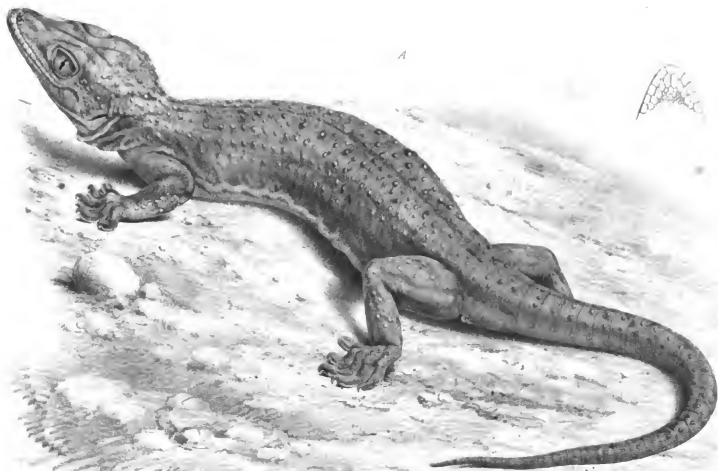
W. West, imp.

A *Tropidoleptus microlepis*. B *Euprepes rufescens*. C *Eup. monticola*. D *Eup. olivaceus*.
 E *Mabouia quadrilineata*. F *Mabouia chinensis*. G *Mabouia khamphavans*. H *Eum. ladacensis*. I *Eum. nivosus*. K *Eum. nivosus*.

B

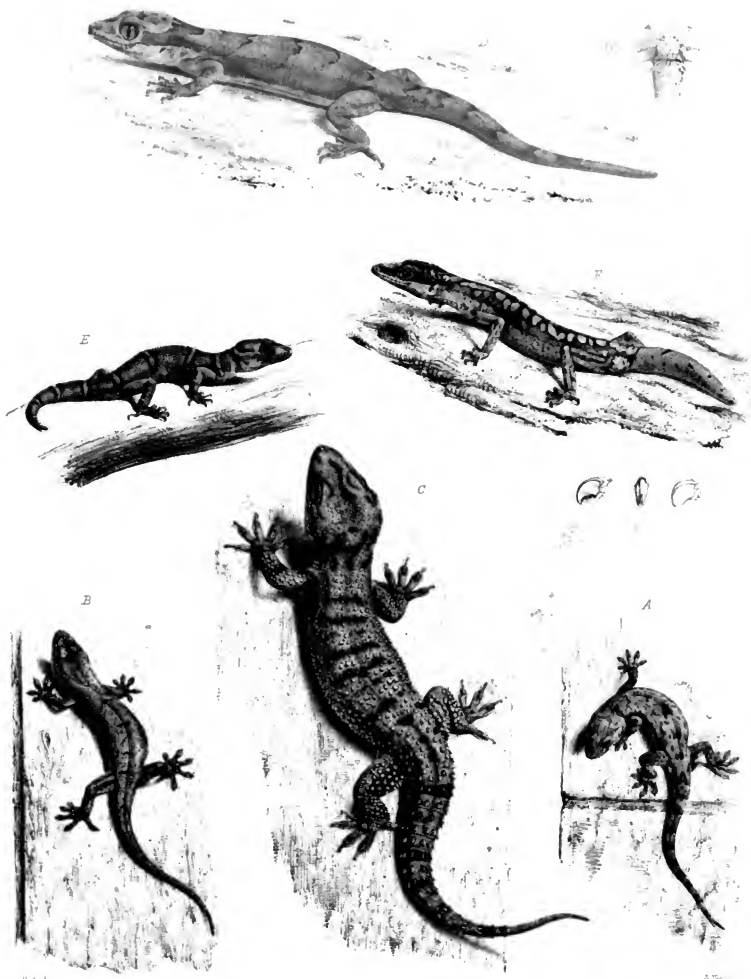


A

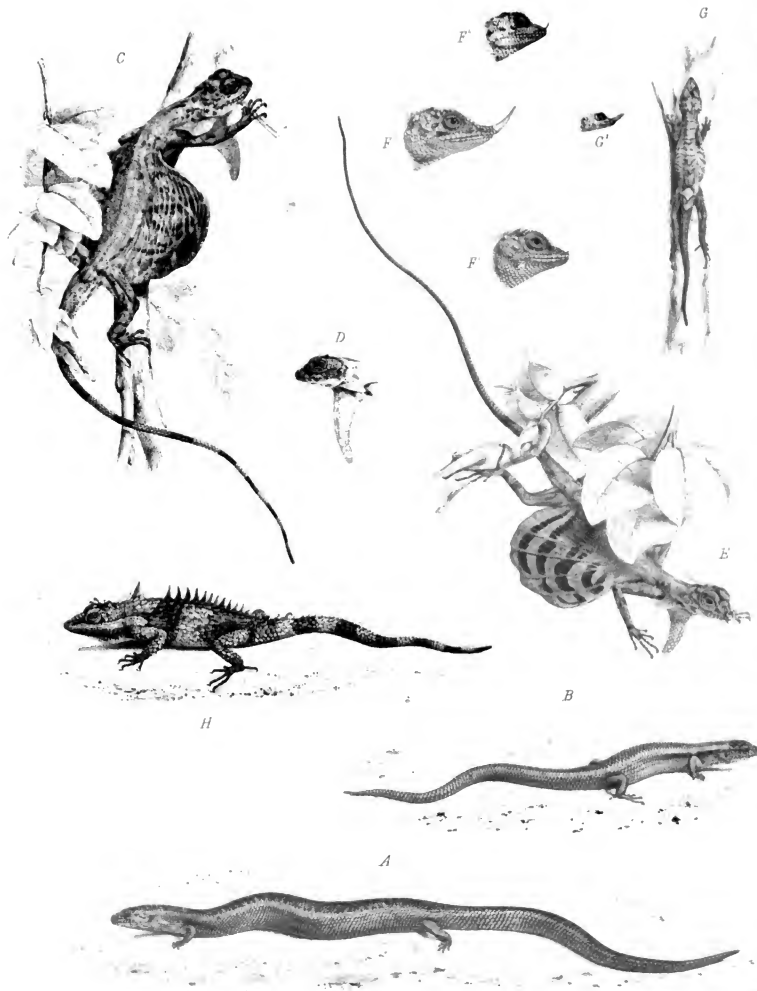


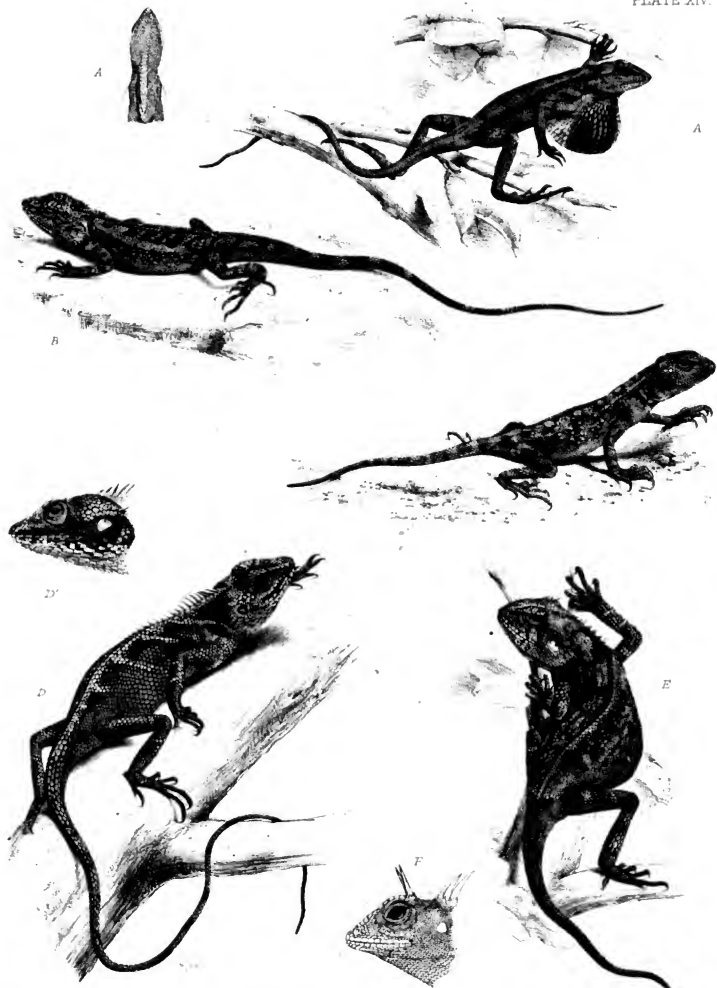
W. Woodbury

A *Gecko stentor*. B *Eublepharis hardwickii*



A *Gekko swinhonis* B *Gekko swinhonis* C *Hemidactylus sibiricus*
D *Gymnodactylus frontatus* E *Gymnodactylus deccanensis* F *Paradactylus fidatus*

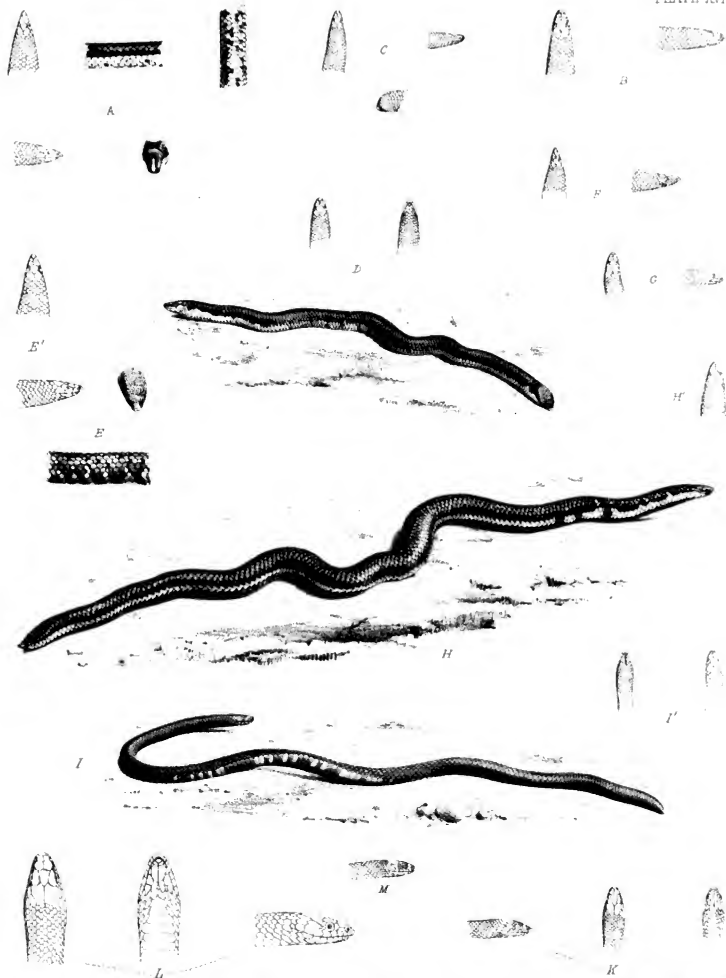




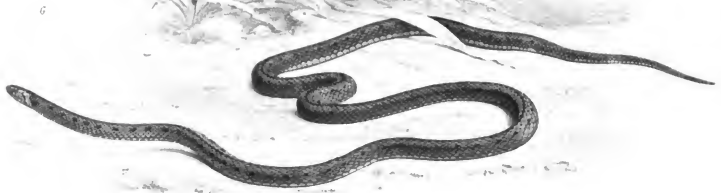


Iguana iguana





A. Rhinophis congreus B. *Silyura macrolepis* C. *Rhinophis pulegiensis* D. *Silyura brevis* E, E'. *Silyura collata* F. *Silyura badonui* G. *Silyura shortii* H, H'. *Silyura bicostata* I, I'. *Melanophis umm* K. *Melanophis umm* L. *Melanophis umm* M.



E



F



F'



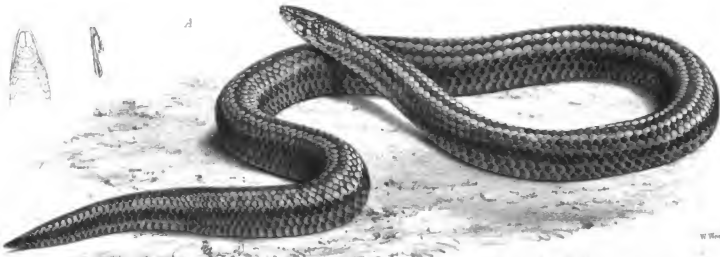
B



D



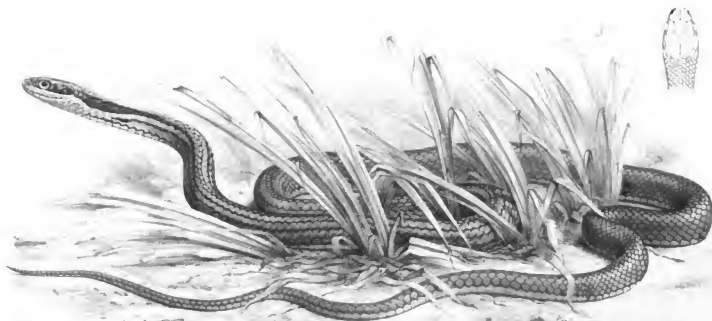
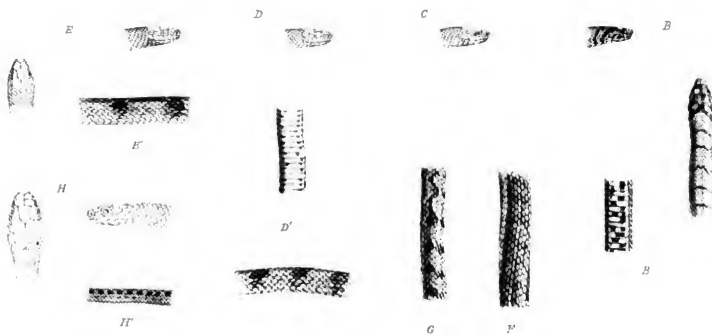
C

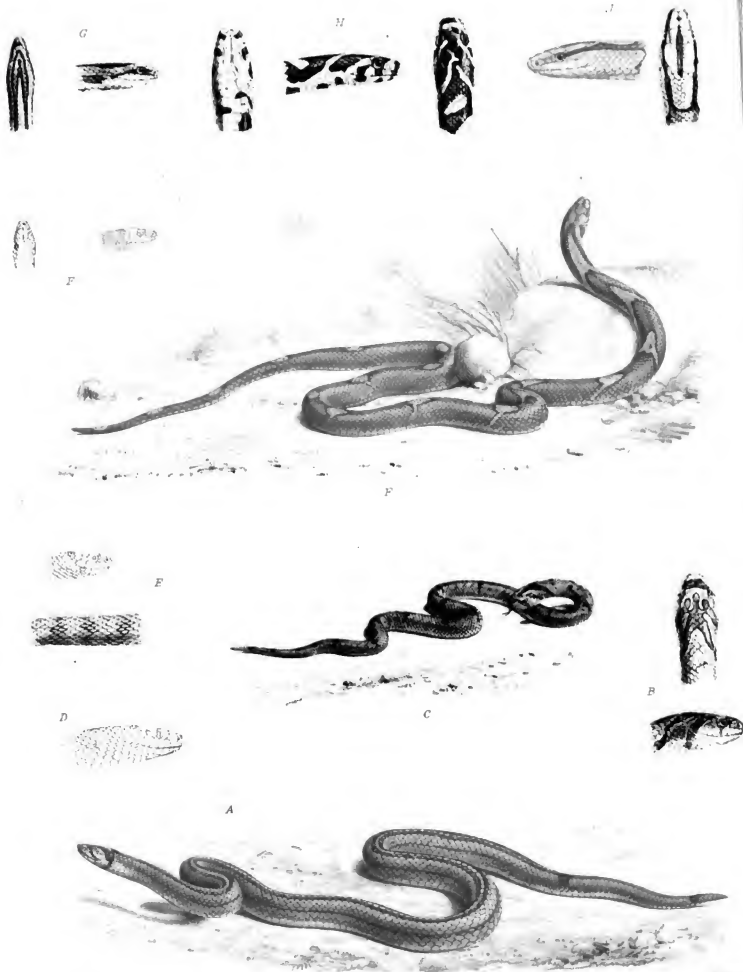


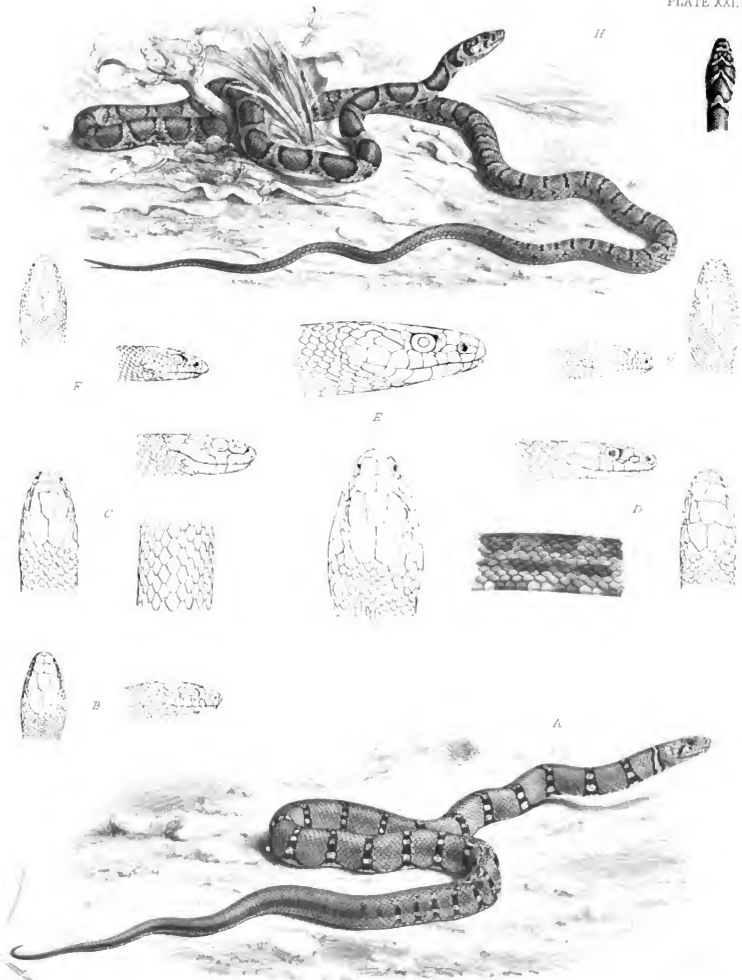
A



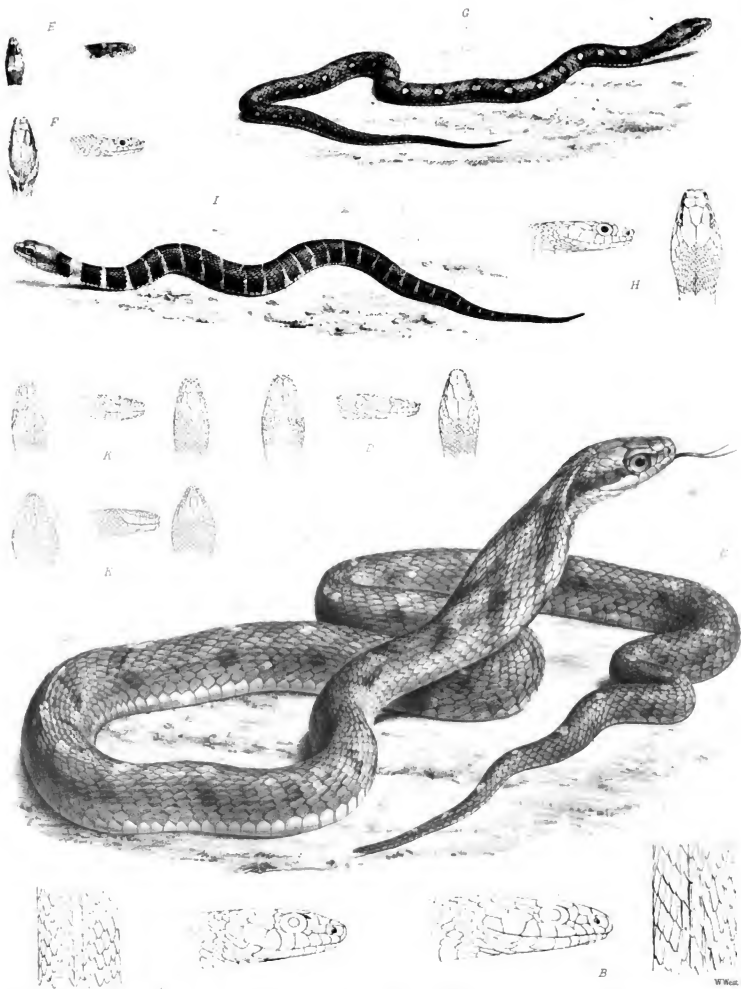
A. *Geophis microcephalus*. B. *Calamaria sumatrana*. C. *Calamaria nigro-alba*.
D. *Macroxolamus lateralis*. E. *Aspidura cepus*. F, F'. *Aspidura trichoprocta*, male & fem. G. *Ninia diademata*.







A. Gophis nularis, *B. Pyllepis carinata*, *C. Kinkaid's*, *D. Gophis*, *E. Gophis*, *F. Gophis*, *G. Gophis*, *H. Gophis*, *I. Gophis*, *J. Gophis*, *K. Gophis*, *L. Gophis*, *M. Gophis*, *N. Gophis*, *O. Gophis*, *P. Gophis*, *Q. Gophis*, *R. Gophis*, *S. Gophis*, *T. Gophis*, *U. Gophis*, *V. Gophis*, *W. Gophis*, *X. Gophis*, *Y. Gophis*, *Z. Gophis*.



G.H. Ried.

A. *Zootis thamnoides*. B. *Zootis nigrumargatus*. C. *Colaptes auratus*. D. *T. platyrus*. E. *T. bedfordi*. F. *T. jancus*. G. *T. xyloneus*. H. *Himalayana*. I. *T. leucomelas*. K. K'. *Hypsiglena*. L. *H. enhydris*. W. *W. enhydris*.

W. West, imp.

